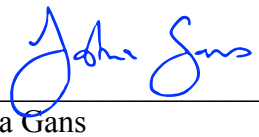
EXHIBIT 3

REDACTED

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF TEXAS
SHERMAN DIVISION

The State of Texas, et. al. Plaintiff, v. Google LLC, Defendant.	Case No: 4:20-cv-00957

Expert Report of Joshua Gans



Joshua Gans

Dated June 7, 2024

> denied them the opportunity to compare those prices with the prices of rival suppliers and for rival suppliers to make competitive price offers. The ability to exercise such choice is fundamental to the process of competition. Google could have varied prices and rules in ways that were apparent to participants but chose not to do so. Google was able to do this as a result of its monopoly power in the relevant markets and vertical integration across those markets. Absent those two conditions, Google could not have engaged in the harmful conduct it engaged in.

19. In summary, while this case involves complex, technical conduct, it has simple, understandable economics at its essence. Google used and uses its monopoly power to engage in conduct that harmed competition in the relevant markets. Google has the incentive and ability to engage in this harmful, anticompetitive conduct because of its vertically integrated structure or ownership and control of products along the ad tech stack. The end result is a less competitive online display advertising industry in the United States, higher prices charged by Google, and lower quality products[2] than would be supplied in a competitive market.[3]

II. THE ECONOMICS OF ONLINE DISPLAY ADVERTISING

20. Before turning to the main parts of this report, I provide a high-level overview of the economics of online display advertising, based on my specialized knowledge in economics, and review of the facts and data in this case.

21. At its heart, the economics of advertising are relatively simple. Publishers' own websites or webpages that contain space to display advertisements or "ads" to anyone who visits their websites. Publishers attract consumers to read their website content, and alongside that content, they offer up space (or inventory) for ads. The total amount of inventory they have available (their production capacity) depends on how many ads they place on a webpage and the number of times consumers view that webpage. That is, unlike a static ad in a traditional print newspaper or publication, a single ad space on a

[2] By lower quality, I mean less of features or abilities desired by consumers.

[3] I understand that certain Plaintiff States are seeking civil penalties under their respective state antitrust or unfair competition laws for the anticompetitive conduct of Google. I understand further that the Plaintiff States Alaska, Arkansas, Florida, Idaho, Kentucky, Louisiana, Mississippi, Montana, Nevada, North Dakota, Puerto Rico, South Carolina, South Dakota, Texas, and Utah seek civil penalties for violations of their state antitrust statutes, and that Kentucky reserves the right to seek a per day penalty as set out in its state statute. My analysis and opinions in this report show that Google engaged in the following anticompetitive conduct, which I understand underlie the Plaintiff States' penalty requests: Tying, Dynamic Allocation, Dynamic Revenue Share, Bernanke, Enhanced Dynamic Allocation, Header Bidding Line Item Caps, Header Bidding Data Redactions, and Unified Pricing Rules. I also address additional conduct—Project Poirot and Google's Facebook agreement—aimed at limiting the impact of Header Bidding. Collectively, the conduct I have analyzed in this report constitute a pattern of anticompetitive behavior on the part of Google.

allowing publishers to solicit bids from multiple exchanges. On the flip side, however, thickness decreases or is undermined by impediments to publishers' or advertisers' use of multiple exchanges and ability to assess and compare different exchanges, including understanding the quality of the matches that might be achieved on one exchange versus another. Later in the report, I document and analyze Google's conduct with respect to tying various advertising products together in ways that limit the ability of advertisers and publishers to interact with exchanges other than Google's own exchange, AdX. Alongside direct competitive concerns, this conduct creates additional inefficiencies by undermining the market thickness that might otherwise be achieved.

33. With respect to Roth's second criteria of overcoming the "congestion" that thickness can bring, Google's conduct has also created inefficiencies, despite developments in online display advertising that would otherwise reduce inefficiencies in the matching of advertisers and publishers. For example, the introduction of real-time bidding took the guesswork out of which channels advertisers could access and bid for publisher ad space. Also, the creation of independent sell-side (publisher) and buy-side (advertiser) tools, which allowed publishers and advertisers to efficiently manage the billions of simultaneous auctions that were being run in order to target particular consumer-advertiser matches. This helped reduce inefficiencies in the matching of advertisers and publishers, as market participants no longer had to guess how to interact with markets at scale. By extension, any restrictions on those ad tech tools that leads to market participants doubting whether they were being presented with the best options would subvert those benefits. Later in this report, I document Google's conduct with respect to creating restrictions on the operation and flexibility of Google's own sell-side tools that caused publishers to make costly investments to provide that flexibility, the costs of which were made higher by Google's own conduct. Alongside the direct competitive concerns from this conduct, namely steering market participants towards Google's exchange AdX, this conduct created additional inefficiencies in matching publishers and advertisers.

34. Finally, as to Roth's third criteria of safety, Google's conduct makes it less safe or a less trustworthy environment for participants in the relevant markets.[6] To understand this criterion, it is important to understand the role of ad exchanges and automation in the online display advertising industry. With the growth of online display advertising to billions of auctions per day, the industry has moved towards more automation. Thus, whereas traditional media might have relied upon sales departments to locate advertisers and negotiate ad placements, the sheer volume of transactions in online markets made such manual negotiations effectively impossible, particularly given the need to create flows

[6] Safety is defined in a broad sense.

42. Website users consume content on the Internet produced by publishers and view the ads placed on the websites they browse. Website users agree to allow publishers' websites to collect data on their characteristics and web browsing behavior, and advertisers leverage this data to target ads more effectively to users; the ads displayed on any given webpage are, therefore, specific to the user viewing it.

43. Publishers are content creators, such as websites and blogs, that utilize display advertising and ad technology to monetize their content. Publishers utilize Google ad technology products, and Google's actions significantly impact the digital publishing business model.

44. Advertisers seek access to publishers' websites' users to promote their brands. Advertisers often utilize advertising agencies for services, enabling brands to reach their advertising campaign goals. Throughout the report, I regroup buy-side players (brands advertising their product and services, and agencies) using buy-side tools under the general term "advertisers." Advertisers also utilize Google ad technology products.

45. Providers of ad tech tools are companies that sell software and tools used to facilitate the buying and/or selling of online display advertisements, helping publishers and advertisers automate their processes and enable large volumes of transactions to take place within seconds. The most relevant ad tech tools include ad servers, which manage publishers' inventory, ad buying tools, which help advertisers optimize their purchases of impressions, and ad exchanges, which act as real-time auction marketplaces to clear transactions. Google is one of the largest providers of ad tech tools and has a significant role in ad tech and advertising services. Google operates a publisher ad server, ad exchange, and ad buying tool for small advertisers, and an ad buying tool for large advertisers.

46. I describe the relevant parties in further detail in the following sections.

1) Website users

47. Website users consume content produced by publishers on websites. For instance, a website user can click on The Wall Street Journal's website to read an article, scroll down the webpage, and navigate to other sections and pages on the website to access more content. When the user visits a webpage, they can be exposed to ads placed on the website; common ad formats include static text/images, animated ads, videos and interactive ads. These ads are typically placed at the top, bottom, or sides of a webpage (called banners). Users can also encounter interstitial ads, i.e., full-page ads which appear while waiting for a webpage to load; pop-up ads, i.e., small windows that appear over a website's content; or rich media display ads, i.e., interactive ads that can include video, audio, and clickable elements. Users may also

4) Ad tech tool providers

61. Advertising technology, or ad tech, plays a fundamental role in the online display advertising industry. It comprises a set of products or tools that publishers and advertisers use to sell, buy, and transact impressions for open web display advertising.

62. As I explain when I consider market definition, the relevant ad tech tools include:

- publisher ad servers – tools that help publishers track, manage and sell their inventory in an automated fashion and maximize their yield
- ad exchanges – software products that enable the programmatic trading of impressions through auctions by connecting ad buyers and ad sellers
- ad buying tools – software products that enable the purchase of ad inventory based on the ad campaign budget and goals, and connect to ad exchanges and to sellers

63. Google is vertically integrated across all relevant product markets that I define below.[19] Google provides the DFP ad server, AdX ad exchange, Google Ads ad buying tool for small advertisers, and DV360 ad buying tool for large advertisers. This integration uniquely positions Google to leverage market power across these markets. In addition, Google offers AdMob for in-app publishers.

64. Google launched its search engine in 1998. It monetized its search engine by selling ads via its AdWords product.[20] Advertisers used AdWords to push their ads higher up on the search engine results page.[21] AdWords was renamed Google Ads.[22]

[19] With the acquisition of Xandr, Microsoft is now also integrated across several relevant product markets. As I show in Section V, Microsoft remains small in the relevant market.
[20] Google. "Google Launched Self-Service Advertising Program" (October 23, 2000). Accessed on April 29, 2024. https://googlepress.blogspot.com/2000/10/google-launches-self-service.html ("Google Inc. developer of the award-winning Google search engine, today announced the immediate availability of AdWords™, a new program that enables any advertiser to purchase individualized and affordable keyword advertising that appears instantly on the google.com search results page […] Google was founded by Stanford doctoral students Larry Page and Sergey Brin in 1998")
[21] Google. "Google Launched Self-Service Advertising Program" (October 23, 2000). Accessed on April 29, 2024. https://googlepress.blogspot.com/2000/10/google-launches-self-service.html ("Google's premium sponsorship ads will continue to appear at the top of the search results page")
[22] Google often internally refers to its ad buying tool for small advertisers, "Google Ads," as "GDN," "Google Display Network," or "AdWords." I will refer to Google's ad buying tool for small advertisers using these terms interchangeably throughout the report unless described otherwise in cited documents. *See for e.g.,* GOOG-NE-11914822 at -824. "Ads Overview: Ads SRE Noogler training" (October 17, 2018). Internal Google presentation introducing the ad industry and Google ad products. ("Google Ads (formerly AdWords).")

65. In 2003, Google began acquiring display advertising technology.[23,24] Ad tech enables the transaction to what is referred to as programmatic advertising, which permits the automated bidding and placement of ads. Google entered ad tech through its acquisition of Applied Semantics, which Google re-branded into AdSense.[25,26] Today, AdSense is part of Google's publisher ad server.

66. In 2008, Google paid $3.1B to acquire DoubleClick.[27] The acquisition included the publisher ad server, DoubleClick for Publishers (DFP), and an incipient ad exchange.[28] DFP managed access and routing of publishers' impressions to exchanges and advertisers. Later in the report, I explain why the acquisition of DoubleClick was one of Google's most significant acquisitions in ad tech.

67. Google continued acquiring ad tech businesses throughout the early 2010s. Acquisitions included the following:

- AdMob, a tool for app developers to monetize their properties through in-app ads,[29]

[23] Ad tech stack is an umbrella term which stands for advertising technology stack and refers to the set of ad tech tools used in the online display advertising.
AdButler. "What is AdTech? Basics of the Ad Tech Ecosystem Explained" (May 5, 2021). Accessed on April 29, 2024. https://www.adbutler.com/blog/article/what -is-ad-tech-the-ad-tech-ecosystem-explained#:~:text=The%20assembly%20of%20an%20%E2%80%9Cad%20tech%20stack%E2%80%9D%20refers,used%20to%20accomplish%20objectives%20within%20the%20advertising%20ecosystem; ("[…] shorthand for 'advertising technology'. It refers broadly to the software, systems, platforms, and ad tech tools used by publishers, advertisers, and other parties to buy, sell, and manage digital advertising")
[24] The New York Times. "Google Timeline" (April 9, 2004). Accessed on April 29, 2024. https://www.nytimes.com/2004/04/29/business/google-timeline.html ("March-April 2003 - The company announces its content-targeted advertising program and the acquisition of Applied Semantics")
[25] Digiday. "Today in History: Google Buys Applied Semantics" (April 23, 2013). Accessed on April 29, 2024. https://digiday.com/media/today-in-history-google-buys-applied-semantics/ ("The acquisition, which was for $102 million in cash and stock […] Google used Applied Semantics to improve its contextual targeting reach")
[26] Google. "Google Expands Advertising Monetization Program for Websites" (June 18, 2003). Accessed on April 29, 2024. https://googlepress.blogspot.com/2003/06/google-expands-advertising-monetization.html ("Google, developed of the award-winning Google search engine, today announced a new self-service option for Google AdSense, a program that enables website publishers to service ads precisely targeted to the specific content of their individual web pages.")
[27] The Seattle Times. "Google finally acquires DoubleClick" (March 12, 2008). Accessed on April 29, 2024. https://www.seattletimes.com/business/google-finally-acquires-doubleclick/ ("Google's long anticipated acquisition of online ad service DoubleClick […] The $3.1 billion deal […]")
[28] The New York Times,. "Google Buys DoubleClick for $3.1 Billion" (April 14, 2007). Accessed on April 29, 2024. https://www.nytimes.com/2007/04/14/technology/14DoubleClick.html ("The sale offers Google access to DoubleClick's advertisement software and, more importantly, its relationships with Web publishers, advertisers and advertising agencies"); DoubleClick launched its exchange in 2007. *See* DoubleClick. "DoubleClick Advertising Exchange." (October 18, 2007). Accessed on April 17, 2024. https://web.archive.org/web/20071001100309200710180156 01/http:/www.doubleclick.com/products/advertisingexchange/index.aspxinsight/pdfs/dc_adxoverview_0704.pdf
[29] AdMob. "Google to Acquire AdMob" (November 9, 2009). Accessed on April 29, 2024. https://web.archive.org/web/20091112010903/http:/blog.admob.com/2009/11/09/google-to-acquire-admob/ ("This morning we announced that AdMob has signed a definitive agreement to be acquired by Google"); *See also,* Google AdMob. "What is AdMob." (undated). Accessed January 19, 2024. https://admob.google.com/home/resources/what -is-admob/#:~:text=Google%20AdMob%20makes%20it%20easy%20for%20developers%20to,innovative%20ad%20formats%2C%20and%20advanced%20app%20monetization%20technology. ("Google AdMob makes it easy for developers to earn money from their mobile apps with high-quality ads. AdMob maximizes the value of every impression by combining global advertiser demand, innovative ad formats, and advanced app monetization technology.")

94. Based on the information in the ad request, including data on the website's visitors, the publisher ad server uses "inventory routing logic"[52] to determine whether to serve a programmatic direct ad or request an ad through another demand source.[53]

95. Publishers' ad servers have used different decision processes over time. In the early days of online display advertising, the most widely used routing logic was the Waterfall process. The Waterfall designated the process for selling publishers' space, in which potential advertisers, or demand sources, are called sequentially, one at a time, to submit bids.[54] Today, the Waterfall is no longer the default routing logic.

96. In the Waterfall setup, if the publisher's ad server called an exchange through its inventory routing logic, the ad exchange requested bids from potential advertisers as sources on the demand-side (including via ad buying tools such as "Demand-Side Platforms" (DSPs), and ad networks). This bid request included some details on the identity of website visitors and other parameters potential advertisers used in determining whether to bid and what to bid.[55] The details included a floor price, representing the minimum price necessary to win the bid, the ad format, the website URL, and the hashed user identifier.

97. The demand sources evaluate the bid request and decide whether to submit a bid and the bid amount based on their targeting parameters and criteria. They then send a bid response to the exchange, including their bid value and a piece of code allowing an ad creative to be displayed in an ad slot.[56,57] The ad exchange reviews all the bids it receives from the demand sources and runs an auction. The exchange runs its auction logic and selects a winner. Auctions in programmatic advertising are often sealed first-

[52] GOOG-AT-MDL-001446407 at -411. "Maximize your earnings with Google Ad Manager" (September 9, 2020, *per metadata*). Internal Google presentation describing key features of GAM. (Document describes the GAM ad serving process as follows: "Website/app gives Ad Manager a list of criteria about which ads would be suitable to fill empty ad slots on the page. […] This is based on criteria such as the size of the ad slot on the page, the date and time of day, and the geographic location of the user."); *See also,* GOOG-AT-MDL-001446407 at -416. "Maximize your earnings with Google Ad Manager" (September 9, 2020, *per metadata*). Internal Google presentation describing key features of GAM. ("With Google Ad Manager, we provide a single UI for all deal types. That has allowed us to become the market leader in this transition since we support all deal types from traditional reservations through programmatic direct to open auction.")

[53] As it will become clear in the report, the ad server plays a key role in the decision logic of the ad serving.

[54] ClearCode. "What is Waterfalling and How Does it Work?" (September 1, 2016). Accessed on April 29, 2024. https://clearcode.cc/blog/what -is-waterfalling/ ("Waterfalling, also known as a daisy chain or waterfall tags, is a process used by a publisher to sell all remnant inventory […] Waterfalling gets its name from the waterfall-like process for selling inventory — i.e. the demand sources are initiated one at a time, one after another.").

[55] Clearcode. "Media-Buying Methods: Programmatic, Real-Time Bidding (RTB), Header Bidding, and PMP" (undated). Accessed on April 29, 2024. https://adtechbook.clearcode.cc/media-buying-methods/ ("The request also passes additional data about the user, such as their location, device type and operating system.")

[56] A creative is the ad served to users on a webpage, app, or other digital environment. Creatives can be images, video, audio, and other formats that get delivered to users. *See* Google Ad Manager Help. "What are creatives?" (undated). Accessed on May 1, 2024. https://support.google.com/admanager/answer/3185155?hl=en

[57] The code which allows an ad creative to be displayed on a page is called "ad markup" *See* AdButler. "AdTech Glossary: Digital Advertising Terms & Jargon to Know" (July 1, 2021). Accessed on May 2, 2024. https://www.adbutler.com/blog/article/ad-tech-glossary-digital-advertising-terms-jargon-to-know

2) In the mid-1990s, as online advertising grew, publisher ad servers emerged as technical intermediaries

102. As the Internet developed, and more visitors viewed more websites, the number of spaces available for advertisements on publisher's websites grew.[61] The increased volume of visits from a larger and more diverse audience created an opportunity for publishers to find a more dynamic way to sell display advertising space on their properties.[62] Publisher ad servers were developed to enable the management and selling of that growing inventory of slots on publishers' websites.

103. The first publisher ad server was introduced in 1996 as one of the first components of the ad tech stack.[63] Publisher ad servers serve as the decision engine, controlling what ads appear on the publisher's website. At the time, publisher ad servers stored ads and served them directly to website visitors based on targeting parameters, such as user location, time of day, and user interests.[64] In Section V.C.1, I show Google's share of the publisher ad server market over time through various metrics, including penetration.

104. In the mid-1990s, as online advertising grew, advertiser, or buy-side, ad servers emerged as technical intermediaries. For advertisers seeking to buy space on publishers' websites, transacting directly with each publisher became increasingly costly. In response, advertiser ad servers emerged in the mid-1990s to streamline the purchasing of ad inventory.[65] Advertiser ad servers emerged as a piece of ad tech used to host, manage and distribute ads, enabling advertisers to manage and store creatives. One type of advertiser ad server, called an ad network, aggregated groups of small advertisers. Many networks emerged between 2003 and 2008, a period that Google refers to as "the age of the ad network."[66] As pools

[61] Impressions refer to an ad that is viewed by a user. A user being exposed to one ad once represents one impression.
[62] ClearCode. "What is an Ad Server and How Does it Work?" (March 12, 2024). Accessed on May 2, 2024. https://clearcode.cc/blog/what -is-an-ad-server/ ("When the popularity of the Internet started to take off in the early to mid 1990s, traditional print publishers began moving online […] Publishers soon discovered they needed a more efficient and easier way to manage their the various advertisers' campaigns that ran on their website. It was here that the first-party (aka publisher's ad server) was born.")
[63] AdButler. "Ad Networks vs Ad Exchanges: The History of Programmatic Advertising" (March 15, 2021). Accessed on May 2, 2024. https://www.adbutler.com/blog/article/ad-networks-vs-ad-exchanges-the-history-of-programmatic-advertising#Enter-Ad-Servers---1995-/-1996. (The first ad server was called Net Gravity. The article also notes that the first display ad was an ad for AT&T posted across the top of HotWired.com's homepage in 1994.)
[64] AdButler. "Ad Networks vs Ad Exchanges: The History of Programmatic Advertising" (March 15, 2021). Accessed on May 2, 2024. https://www.adbutler.com/blog/article/ad-networks-vs-ad-exchanges-the-history-of-programmatic-advertising#Enter-Ad-Servers---1995-/-1996 ("Define ad serving rules through ad targeting options […] Contextual (placing ads based on semantically related keywords) Geographic (serving certain ads to users based on their location) Dayparting (scheduling certain ads to display on different days / times) Behavioral (users who have demonstrated interest in similar niche websites)")
[65] ClearCode. "The History of Digital Advertising Technology" (undated) Accessed on May 2, 2024. https://adtechbook.clearcode.cc/history-advertising-technology/ ("The first ad servers began popping up in 1995 and initially were used to control the delivery and management of online ads.")
[66] GOOG-AT-MDL-B-001060629 at -629. "Header Bidding Working Group" (May 2016). Internal Google document describing the current state of Header Bidding.

of small advertisers, ad networks, were particularly adept at purchasing publishers' "remnant" inventory (i.e., slots on websites for display that would have previously gone unsold).[67]

3) Ad exchanges emerged as a technical intermediary product connecting publisher supply with advertiser demand

105. In the early 2000s, shortly after publisher and advertiser-side servers were developed, ad exchanges emerged as a junction between the sell-side and the buy-side. Unlike ad networks, which only enabled publishers and advertisers to transact inventory in bulk, ad exchanges enabled the transaction of ad inventory on an individual impression level. DoubleClick's exchange announcement explained that exchanges are "an impression-by-impression auction marketplace."[68]

106. With the rise of ad exchanges, online inventory became more easily transactable.[69] When a publisher had inventory to sell, the publisher's ad server could share the details of the inventory with the ad exchange instead of selling through an ad network. The ad exchange ran an auction to sell ad inventory to the highest bid among the demand sources, including ad networks.

107. In the Waterfall process, demand partners were ranked sequentially based on their average historical yield rather than based on the impression value. When a publisher had an impression to sell, the publisher ad server would call each demand partner sequentially, from highest to lowest historical yield, and select the first demand partner with a bid at or above the minimum bid requested by the publisher. This meant that the Waterfall set-up disregarded potential higher bids from other demand partners further down the list. Demand sources did not compete head-to-head, and the Waterfall system did not maximize yields for publishers. Demand partners with little bid history therefore had a low chance of winning the impression.

108. As AppNexus[70] explains: "That static value determines the order in which those partners are offered impressions. But since programmatic buyers produce a different bid for every impression, there's

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[67] Remnant inventory designates unsold inventory.
[68] DoubleClick. "DoubleClick Advertising Exchange" (undated). Accessed on April 17, 2024. https://web.archive.org/web/20071001100309/http:/www.doubleclick.com/products/advertisingexchange/index.aspx
[69] Google User Content. "The Arrival of Real-Time Bidding and What it Means for Media Buyers" (July 2011). Accessed on May 2, 2024. https://web.archive.org/web/20120130062954/http:/static.googleusercontent.com/external_content/untrusted_dlcp/www.google.com/en/us/doubleclick/pdfs/Google-White-Paper-The-Arrival-of-Real-Time-Bidding-July-2011.pdf ("When ad exchanges opened, they brought more liquidity to the marketplace for online inventory. 2007 was a pivotal year for ad exchanges […] made vast pools of inventory available, which greatly improved the experience for many parties to transact in online display.")
[70] AppNexus operates an ad exchange business. *See,* The Wall Street Journal. "What is AppNexus? We explain What the Ad Tech Company Does" (December 1, 2016). Accessed on May 2, 2024. https://www.wsj.com/articles/what -is-appnexus-we-explain-what -the-ad-tech-company-does-1480632208.

no way of knowing whether the first partner in the waterfall is actually the one prepared to offer the highest bid. In many instances, this has caused publishers to sell impressions at a lower price than what a partner further down the waterfall would have been willing to pay. Every time this happens, publishers lose revenue that should have been theirs."[71] The Waterfall process thus had obvious flaws. As explained by AppNexus, "The waterfall was leaking money with every new auction. Publishers needed something better."[72]

4) New technologies emerged, enabling publishers and advertisers to optimize inventory transactions

109. Around 2007, "Supply-Side Platforms" (SSPs) were created "to manage all of the back office on behalf of publishers."[73] SSPs allowed publishers to sell their inventory and optimize ad inventory sales via parameters like bid floors and ad frequency caps, among others. These types of ad tech tools were later integrated into publisher ad servers and ad exchanges as part of these tools' inventory routing logic.

110. Similarly, on the buy-side, starting in 2008, some ad networks pivoted to become more like ad buying tools.[74] These terms are sometimes used interchangeably. Some ad-buying tools, called DSPs, enable advertisers to set parameters, like maximum bid price, to programmatically (i.e., automatically) buy individual impressions. Advertisers can benefit from the expertise of an ad network that selects optimal ad inventory and bears the responsibility of meeting the advertiser's campaign goals. A DSP, however, places that responsibility on the advertiser and larger and more sophisticated advertisers may prefer having that control. DSPs are usually referred to as ad buying tools for large advertisers. Advertisers with a limited advertising budget, who may find it difficult to win bids for an ad space through the ad exchange, can utilize ad buying tools for small advertisers to connect with publishers who can reach the advertiser's target audience.

111. Real-time bidding (RTB) emerged as a solution to the sequencing issues posed by the Waterfall process, enabling advertisers to take advantage of this new liquidity and scale their advertising

[71] AppNexus. "Header Bidding: The Next Evolution" (2017). Accessed on May 2, 2024. https://www.appnexus.com/sites/default/files/whitepapers/header-bidding-2017.pdf
[72] AppNexus. "Header Bidding: The Next Evolution" (2017). Accessed on May 2, 2024. https://www.appnexus.com/sites/default/files/whitepapers/header-bidding-2017.pdf
[73] GOOG-TEX-00896446 at -446. "Header Bidding Working Group Tentative Document Structure" (May 2016). Internal Google document to develop a thorough, research-based review of the current state of Header Bidding.
[74] GOOG-TEX-00896446 at -447. "Header Bidding Working Group Tentative Document Structure" (May 2016). Internal Google document to develop a thorough, research-based review of the current state of Header Bidding. ("Seemingly overnight, behavioral ad networks & traditional networks pivoted into Retargeters & DSPs.")

campaigns.[75] Ad exchanges introduced RTB to sell individual impressions the moment a user enters a publisher's webpage. Information about the user entering the website is provided in the auction, leading to improved ad targeting for advertisers. The entire real-time ad-serving process occurs within the time it takes for a webpage to load, about 100-150 milliseconds.[76] This loading time is usually not even noticed by the user, as ads appear almost at the same time as the webpage.

112. A wave of exchanges and sell-side platforms announced support for RTB between 2009 and 2010, with ad tech tools like AdBrite, AdMeld, OpenX, PubMatic, Adap.tw, AdJug, ContextWeb, and Rubicon publicly announcing RTB support.[77] Similarly, DoubleClick Ad Exchange announced RTB support in 2009.[78]

113. RTB provided benefits to advertisers, such as increased CPM rates and CTR (click-through rates) performance. As a consequence, RTB was quickly adopted. The percentage of spend via RTB on DoubleClick Ad Exchange grew from 8% in January 2010 to 64% a year later.[79]

114. Google enabled real-time bidding on its ad-serving tech through a feature that was part of its DoubleClick acquisition.[80] This feature, called Dynamic Allocation, allowed AdX to submit real-time

[75] Google User Content. "The Arrival of Real-Time Bidding and What it Means for Media Buyers" (July 2011). Accessed on May 2, 2024. https://web.archive.org/web/20120130062954/http:/static.googleusercontent.com/external_content/untrusted_dlcp/www.google.com/en/us/doubleclick/pdfs/Google-White-Paper-The-Arrival-of-Real-Time-Bidding-July-2011.pdf ("Real-time bidding helps media buyers find audiences at scale […] more liquidity to the marketplace")

[76] ClearCode. "Media-Buying Methods: Programmatic, real-time Bidding (RTB), header Bidding, and PMP" (undated). Accessed on April 29, 2024. https://adtechbook.clearcode.cc/media-buying-methods/ ("The request also passes additional data about the user, such as their location, device type and operating system [...] This entire process happens in real time when an ad is loaded onto the page, usually within 100–150 milliseconds.")

[77] Google User Content. "The Arrival of Real-Time Bidding and What it Means for Media Buyers" (July 2011). Accessed on May 2, 2024. https://web.archive.org/web/20120130062954/http:/static.googleusercontent.com/external_content/untrusted_dlcp/www.google.com/en/us/doubleclick/pdfs/Google-White-Paper-The-Arrival-of-Real-Time-Bidding-July-2011.pdf. The timeline is provided in Figure 2.

[78] Google User Content. "The Arrival of Real-Time Bidding and What it Means for Media Buyers" (July 2011). Accessed on May 2, 2024. https://web.archive.org/web/20120130062954/http:/static.googleusercontent.com/external_content/untrusted_dlcp/www.google.com/en/us/doubleclick/pdfs/Google-White-Paper-The-Arrival-of-Real-Time-Bidding-July-2011.pdf. The timeline is provided in Figure 2.

[79] Google User Content. "The Arrival of Real-Time Bidding and What it Means for Media Buyers" (July 2011). Accessed on May 2, 2024. https://web.archive.org/web/20120130062954/http:/static.googleusercontent.com/external_content/untrusted_dlcp/www.google.com/en/us/doubleclick/pdfs/Google-White-Paper-The-Arrival-of-Real-Time-Bidding-July-2011.pdf ("ADX inventory sold through RTB jumped from 8% in January 2010 to 68% in May 2011—a tremendous upswing in just under a year and a half").

[80] DoubleClick. "DoubleClick Advertising Exchange" (undated). Accessed on April 17, 2024. https://web.archive.org/web/20071001100309/http://www.doubleclick.com/products/advertisingexchange/index.aspx ("DoubleClick's proprietary Dynamic Allocation system sells inventory through the channel that pays the highest price, in real time.")

bids for inventory sold on DFP, while other industry participants did not have this option. Other exchanges were also excluded from accessing DFP publishers' inventory in real-time.[81]

5) In the early 2010s, publishers started developing home-grown solutions to allow non-Google exchanges and DSPs to submit real-time bids

115. Around 2014, publishers began to experiment with a new approach to overcome the Waterfall and Google's Dynamic Allocation limitations on real-time bidding from other exchanges and DSPs. An initial home-grown solution allowed non-Google exchanges and DSPs to also submit real-time bids. Publishers began adding a script in the header tag of their web pages, which allowed participating exchanges and DSPs to submit bids for impressions in an auction run on the publisher's webpage.[82] This process, known as Header Bidding, occurred before the impression was sent to the publisher ad server.[83] The publisher ad server would then receive the winning bid from the Header Bidding auction.[84]

116. Header Bidding allowed publishers to circumvent Google's exchange by offering their ad inventory directly to other exchanges and, ultimately, advertisers. Moreover, for the first time, rival exchanges and DSPs had the opportunity to bid on DFP publisher inventory, which was previously only available through AdX.[85] In other words, Header Bidding provided demand sources with a new route to

[81] Google (undated). "Maximizing advertising revenues for online publishers". [White Paper]. https://static.googleusercontent.com/media/www.google.com/en//googleblogs/pdfs/revenue_maximization_090210.pdf ("Dynamic allocation is a unique technology that works by passing to the Ad Exchange the CPM value associated with any non-guaranteed ad that DFP is about to serve."); *See also,* DoubleClick Ad Exchange (undated). "Profiting from Non-Guaranteed Advertising: The Value of Dynamic Allocation & Auction Pricing for Online Publishers" 2010. DoubleClick by Google. p.3. [White Paper]. https://web.archive.org/web/20170830013310/http:/static.googleusercontent.com/media/www.google.com/en/us/adexchange/DC_Ad_Exchange_WP_100713.pdf ("Combined with Dynamic Allocation, DoubleClick Ad Exchange's real-time auction mechanism enables publishers to receive the highest yield across all participating buyers for any given ad impression. An approach employed by some third-party technology providers, by contrast, estimates and computes a priori the expected CPM from a given buyer. These systems use average, historical CPM values to predict the price that a given buyer will pay, then use that predicted value to call the ad network with the highest projected CPM.")

[82] AdExchanger. "The Rise Of 'Header Bidding' And The End Of The Publisher Waterfall" (June 18, 2015). Accessed on April 26, 2024. https://www.adexchanger.com/publishers/the-rise-of-header-bidding-and-the-end-of-the-publisher-waterfall/ ("To enable it, publishers put a piece of code in the header of their pages, allowing demand sources to submit bids before the ad server callout […] That is, a single unified auction where demand sources compete side by side rather than sequentially")

[83] Adpushup. "Header Bidding Explained" (undated). Accessed on May 2, 2024. https://resources.adpushup.com/header-bidding-explained ("Header bidding is an advanced programmatic technique that allows publishers to offer their inventory to multiple SSPs and ad exchanges before requesting ad servers from DoubleClick for Publishers (DFP).")

[84] Sovrn. "Header Bidding Explained: Terms to Know" (September 12, 2016). Accessed on May 2, 2024. https://www.sovrn.com/blog/header-bidding-explained-terms-know/#:~:text=Ad%20server%20%E2%80%93%20The%20winning%20bids%20from%20header,compete%20against%20AdX%20dynamic%20allocation%20at%20that%20time ("Ad server – The winning bids from header bidding auctions are sent along to the publisher's ad server to select the appropriate line item and return the winning creative to the correct zone on the page. For most publishers using DFP, the winning bid must also compete against AdX dynamic allocation at that time.")

[85] Ad_Ops Insider. "Header Bidding Explained Step-by-Step" (June 8, 2015). Accessed on May 2, 2024. https://www.adopsinsider.com/header-bidding/header-bidding-step-by-step/ ("tag based integrations create inefficiency because they force an average rate to compete with the impression level bids of AdX (if the publisher is on DFP).")

reach publishers' inventory; this new route was no longer exclusively controlled by the publisher ad server. As an "auction of auctions," Header Bidding was a first-price auction.[86]

117. Header Bidding used wrappers to set parameters for the Header Bidding auction, which allowed publishers to easily add and manage new demand sources without increasing page load times. Wrappers are JavaScript codes, separate from other codes present on a publisher's site, that trigger the bidding process between a publisher and their demand partners once a user visits a webpage. These wrappers enable the auction to take place directly on the publisher's page. For this reason, they are often referred to as client-side wrapper. One of the most popular client-side wrappers is Prebid.js, which has a library of demand sources that publishers can add and remove easily.

118. Client-side wrappers gave publishers visibility into bids but also came with technical limitations. In particular, client-side Header Bidding contributed to latency issues during the initial page load and auction execution. It also required major set-up investments from the publisher. Server-side Header Bidding that moves the auction to a dedicated server evolved as a solution to the latency and investment issues. Instead of residing on the publishers' web pages, the code resides on the server, which executes the entire auction logic remotely and selects a winner. The tradeoff for solving the client-side wrapper issues, however, is that server-side solutions offer less transparency to publishers.

119. The flexibility and features of Header Bidding made it appealing to publishers. It provided them with more transparency and control than the Waterfall process and guaranteed better yield management. Header bidding also allowed advertisers to access previously unavailable inventory by bypassing ad exchanges.[87]

IV. RELEVANT ANTITRUST MARKETS

120. In this section of the report, I identify the markets relevant to my analysis.[88] I start by providing the key economic principles of defining a relevant antitrust market. I then analyze each of the relevant markets. For each market, I consider various factors that assist in defining the markets. I then apply the

[86] Adpushup. "Header Bidding" (undated). Accessed on May 2, 2024. https://www.adpushup.com/header-bidding-guide/#:~:text=Header%20auction%20works%20on%20the%20first-price%20auction%20model%2C,pay%20exactly%20what%20they%20bid%20during%20the%20auction ("Header auction works on the first-price auction model, which means that the highest bidder gets to serve their ad creative, and they pay exactly what they bid during the auction.")

[87] AdExchanger. "The Rise of 'Header Bidding' And The End of the Publisher Waterfall" (June 18, 2015). Accessed on May 2, 2024. https://www.adexchanger.com/publishers/the-rise-of-header-bidding-and-the-end-of-the-publisher-waterfall/ ("Header bidding solves a buyer problem: the need for access to a publisher's best inventory. And it solves a publisher problem: the loss of programmatic revenue because of server setups that reduce competition.")

[88] I use the terms relevant market and antitrust market interchangeably. I may also refer to a market as a shorthand for product market.

servers used for the sale of open web display advertising.[107,108] I discuss this difference in Section IV.C.3.b.

138. Ad servers can be used by publishers to offer display advertising, in-app advertising, and video advertising. It can also be used to facilitate direct deals with advertisers. However, publishers that sell display ad space on the open web must use an ad server. Effective substitution by publishers selling web display inventory would imply switching entirely from the open web to an alternative type of inventory most publishers do not have, such as in-app advertising where another tool, other than an ad server can be used. The substitution away from open web display advertising would have to be complete. This is because if a publisher sells both in-app and open web display, it must still use an ad server. This alone does not mean that a monopolist that owned all publisher ad servers could not exercise market power.

139. Some publishers do own several types of inventories. They perceive these different deal types as complementary sources of monetization, and "fundamentally believe they get maximum yield through a broad mix of deal types."[109] For instance, The Washington Post owns both a website and a mobile app. In this case, a publisher ad server for the sale of open web display advertising is still required.

140. The main Google product in this market is DoubleClick for Publishers or DFP. In 2008, Google acquired DoubleClick and its ad serving tool, DoubleClick for Publishers (DFP).[110] DFP enabled publishers to make real-time decision about what ad to serve, serve ads on their websites, manage their ad inventories, and collect data related to their inventory. Starting in 2016, Google consolidated its ad

[107] Google reflects this segmentation and differentiates between in-app and display for questions of market definition, performance, penetration rate, and product development. *See,* GOOG-NE-03467508 at -511, 514, 516, 535, 543. "Business Forecasting Meeting (Sell-Side)" (June 24, 2019). Internal Google presentation to review past performance, forecast the sell-side business, and develop business strategies; GOOG-NE-03615215 at -217. "Platforms & Media Pricing Review" (May 2015). Internal Google presentation reviewing different ad platforms and their prices; GOOG-NE-03900351 at -357, 360. "Q1 2017 DVAA Metrics Review: Health of the Display & Video Business" (March 22, 2017). Internal Google presentation reviewing display and video business by the DVAA team; Google also notes the difference in market growth. *See,* GOOG-NE-03900351 at -357. "Q1 2017 DVAA Metrics Review: Health of the Display & Video Business" (March 22, 2017). Internal Google presentation reviewing display and video business by the DVAA team. ("Highest growth is coming from Apps, web inventory flattening.")

[108] GOOG-NE-06866438 at -511. "Sell-side All Hands" (February/March 2018). Internal Google PowerPoint on sell-side tools topics (yield maximization, web developers, etc.). (Presentation delineates that the "market segmentation that applies to the vast majority (over 90%) of app developers: publishers who are app-centric or app-only" use AdMob, while publishers who have both app and web inventory use DFP); *See also,* GOOG-NE-07251927 at -995. "Display and Video Strategy Book" (August 2014). Internal Google document about its business, platforms, and strategies. ("Mobile app developers are considered a separate customer segment from (web) content publishers, and AdMob is their monetization platform."); GOOG-NE-04001130 at -131. "What are the guiding principles and approached for our publisher strategy, given the ecosystem change?" (September 10, 2018). Internal Google paper discussing about Google's sell-side business. (Google further makes the distinction between both types of publishers: "App developers using AdMob are mostly pure play with little/no web presence," which sets them apart from open web display publishers.)

[109] GOOG-NE-13244847 at -848. "Re: Update on AdX YM: Client feedback and Latest Progress" (February 2, 2011). Internal email thread between Scott Spencer, Jonathen Bellack, [redacted], and others.

[110] The Seattle Times. "Google finally acquires DoubleClick" (March 12, 2008). Accessed on April 29, 2024. https://www.seattletimes.com/business/google-finally-acquires-doubleclick/

exchange (AdX) and publisher ad server (DFP) contracts into a single contract (DRX contracts). In 2018, Google officially merged DFP and AdX under the Google Ad Manager umbrella (GAM).[111]

141. Today, other participants in this market are Equativ (offers SmartAd Server), Rubicon (offers Magnite for sellers), AdButler (offers its Display Ad Server solution), and Broadstreet (offers its Broadstreet ad server).[112,113] All these competitors offer open web display ad serving capabilities to publishers. These products are differentiated and have varying arrays of features.

- Google offers open web display ad serving capabilities to publishers. It also enables the transaction of other types of inventories, such as in-stream video, in-app, and Connected TV. Google is closely integrated with its ad exchange.

- Equativ offers open web display ad serving capabilities to publishers. Its ad serving capability is closely integrated with its SSP capability. Equativ also offers the Equativ AdvancedTV platform for publishers to monetize Connected TV inventory.[114]

- Rubicon offers an open web display ad serving capabilities to publishers. It is closely integrated with Rubicon's SSP and also offers capabilities for the monetization of other types of inventories such as video, or Connected TV.[115]

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[111] Google Blog. "Introducing Google Ad Manager" (June 17, 2018). Accessed on June 5, 2024. https://blog.google/products/admanager/introducing-google-ad-manager/ ("That's why, for the last three years, we've been doing more to bring DoubleClick Ad Exchange (AdX) and DoubleClick for Publishers (DFP) together into a truly unified platform [...] With these changes, we needed a new name that better reflects how our platform helps you earn more and protects your brand […] As we announced today, that name is Google Ad Manager.")

[112] I discuss entries and exits of competitors in the relevant product market in Section V.

[113] The top 10 alternatives to Google Ad Manager, reviewed by the business software review platform G2, are OpenX, PubMatic, Smart AdServer, Magnite (for sellers), Facebook Audience Network, AdButler, Kevel, ONE by AOL, Unity Ads, and Broadstreet. *See,* G2. "Top 10 Google Ad Manager Alternatives & Competitors" (undated). Accessed on May 2, 2024. https://www.g2.com/products/google-ad-manager/competitors/alternatives. I exclude six of these alternatives: 1) OpenX exited from the ad server market in 2013. *See,* AdExchanger. "OpenX Shuts Down Its OnRamp Ad Server After Big Malware Attack" (February 11, 2013). Accessed on May 2, 2024. https://www.adexchanger.com/online-advertising/openx-shuts-down-its-onramp-ad-server-after-big-malware-attack/; 2) PubMatic is now an SSP, rather than a publisher ad server. *See,* PubMatic. "PubMatic SSP: Maximize Advertising Revenue and Control How Your Audiences are Accessed" (undated). Accessed on May 2, 2024. https://pubmatic.com/products/pubmatic-ssp-for-publishers/; 3) Facebook Audience Network, rebranded to Meta Audience Network, serves in-app ads, rather than online display ads. *See,* Meta. "Monetize your mobile game" (undated). Accessed on May 2, 2024. https://www.facebook.com/audiencenetwork/; 4) Kevel is a self-hosted publisher ad server, or "in-house" tool, that is not a substitute for DFP. *See,* Kevel. "Own your own ad platform" (undated). Accessed on May 2, 2024. https://www.kevel.com/ad-platform; 5) ONE by AOL, which was rebranded to the Oath ad server, shuttered in 2020. *See,* AdExchanger. "Verizon Media Shuts Down Its Ad Server; Legacy Brands Stave Off the DTCs" (March 6, 2019). Accessed on May 2, 2024. https://www.adexchanger.com/ad-exchange-news/wednesday-03062019/#:~:text=Verizon%20Media%20will%20shutter%20the,of%20its%20mobile%20app%20SDK; 6) Unity Ads offers a publisher ad server for in-app ads, rather than display ads, and is thus not a substitute for DFP. *See,* "Grow your mobile app with Unity Ads" (undated). Accessed on May 2, 2024. https://unity.com/products/unity-ads

[114] Equativ. "Industry Expertise + Customized Solutions = Success" (undated). Accessed on May 8, 2024. https://equativ.com/solutions/

[115] Magnite. "Sellers" (undated). Accessed on May 9, 2024. https://www.magnite.com/sellers/.

Table 1

Pricing for Top Publisher Ad Servers[136]

Publisher Ad Server	Pricing Model
DFP	Small Business and Premium products with CPM volume tiers; Additional fees for add-on services; Higher fees for other types of inventory such as video inventory, Connected TV inventory, and direct deals
AdButler	Free trial period; monthly fee varies based on ad requests and number of advertisers
Broadstreet Ad Server	Monthly fee varies based on add-on features

2) The HMT reveals that publisher ad servers used for the sale of open web display advertising is a relevant product market

157. Based on my application of the HMT or hypothetical monopolist test, a small increase in the price of publisher ad servers above competitive levels would not result in significant substitution by open web display publishers to other products. In response to an increase in price, publishers have two potential options.

158. The first option would be for publishers to stop selling or monetizing their ad inventory on their web properties. This would result in significant losses. For example, a large publisher such as The New York Times has over 9.7 million digital-only subscribers. It attributes 20.8% of revenue to advertising, with 62.9% of that, roughly $318MM, generated through digital advertising in 2023.[137] It is highly unlikely a 5% price increase in the market for publisher ad server used for the sale of open web display advertising would cause the publishing giant to eliminate digital advertising from its content.

[136] The table lists the top publisher ad servers listed by the business software review platform, G2. As mentioned, I exclude six of these alternatives. *See,* G2. "Top 10 Google Ad Manager Alternatives & Competitors" (undated). Accessed on May 2, 2024. https://www.g2.com/products/google-ad-manager/competitors/alternatives.

[137] The New York Times. "2023 Annual Report" (undated). Accessed on May 8, 2024. https://nytco-assets.nytimes.com/2024/03/2023-Annual-Report_WR_-Final.pdf ("Paid digital-only subscribers totaled approximately 9.70 million as of December 31, 2023"; page 80 provides the revenue breakdowns)

159. For publishers who do not have other selling or monetization channels as part of their current businesses, creating those new channels would involve a significant cost. For instance, charging users for content or taking out paid subscriptions would require changing their relationship with those users who are currently used to content that was freely available. Publishers would need to convince their user base to pay for content that was previously free; something users are often reluctant to do. Publishers would risk losing significant revenue generation and a large portion of their user base.

160. A second response to a SSNIP would be to build in-house serving capabilities to replace the publisher ad server. Building and maintaining in-house tools is more costly than a SSNIP. It requires significant financial investments in terms of infrastructure and personnel and are, thus, not a reasonable substitute.

3) In-house tools and mediation tools are not participants in the relevant product market for publisher ad servers used for the sale of open web display advertising

161. As depicted below in Figure 3, some publishers, such as Facebook and Amazon, are Walled Garden Publishers (WGPs). Google explains that unlike open-web display inventory, Walled Garden inventory is not "accessible to everyone."[138] In a WGP, advertisers are matched to one and only one publisher.

[138] GOOG-TEX-01201334 at -362. "Buyside Deep Dive" (March 2018). Internal presentation on buy-side tools.

168. WGPs (e.g., Facebook, Snapchat, Amazon, etc.) typically built their own in-house tools to sell "directly to the advertisers."[151] These publishers are not only very large but they have a recurring and loyal user base. Most publishers lack both the resources and the unique user base to become a WGP, and therefore, becoming a WGP is not a viable option for most publishers.

169. According to Google: "walled gardens happen when one company captures a very large loyal audience. That gives them access to consumer data and control over ad formats."[152] In that case, in-house tools enable publishers to keep control over who can access their ad formats and data. For example, Facebook is a publisher with an in-house tool. Google summarizes the difference in an internal strategy document: "Facebook is doing this already – they are offering publishers access to FB demographic data if they use Facebook's Liverail exchange, while at the same time, they do not allow our DBM tool to buy Facebook's O&O inventory."[153] O&O inventory is distinct from display advertisements, e.g., Facebook O&O inventory is a social media advertisement.

170. Google acknowledges that Amazon's business model sets it apart from Google's advertising business.[154] Amazon closely links its advertising business to its core sales and so uses its advertising business to fuel its marketplace sales. Amazon's ad buying tool, Amazon Ad Console, developed by Amazon for vendors to purchase content on Amazon properties only, is an example of a large publisher developing an advertiser-facing in-house tool for its specific needs. An internal presentation explains that "While [Amazon would] certainly love to make money on Ad Tech, they can use [Amazon Console] to offer lower prices to consumers – increasing overall sales."[155] [redacted][156] Google also acknowledges this particularity: "One important thing to note

[151] Deposition of [redacted] 125:18-126:23, April 23, 2024. ("Q. Do you have an understanding of what publishers would be included in this "walled gardens" term? […] THE WITNESS: In general, it would be publishers who do not use, you know, any of the, you know, ad tech platform, you know, or make their inventory available. You know, only directly to the advertisers.")
[152] GOOG-TEX-00036284 at -320. "DRX Introduction" (December 2015). Internal Google presentation by DRX PM and eng team.
[153] GOOG-TEX-00036284 at -320. "DRX Introduction" (December 2015). Internal Google presentation by DRX PM and eng team.
[154] GOOG-NE-09710197 at -289. "Competitive Strategy Update DVAA Staff" (July 31, 2018). Internal Google presentation about firm strategy. ("Amazon is a different type of competitor: ads drive retail value")
[155] GOOG-NE-09710197 at -289. "Competitive Strategy Update DVAA Staff" (July 31, 2018). Internal Google presentation about firm strategy.
[156] [redacted]

other competitors' products all share the characteristics of ad exchanges for transacting indirect open web display advertising, including enabling the programmatic trading of impressions through live auctions, connecting sell-side and buy-side tools, and collecting data. Some players do not limit their offerings to the transaction of open web display advertising and focus more heavily on specific inventory types. For example, Magnite focuses on the transaction of Connected TV inventory and in-stream video inventory.[173] Other differences in offering include integration capabilities. For instance, AdX is closely integrated with other Google products, such as Google Ads.

182. Only a few competitors in the market for ad exchanges also provide buy-side and sell-side tools. The Magnite ad exchange has diversified its offerings, operating a streaming content publisher ad server and data management platform, as well as offering ad tech tools to advertisers on the buy side.[174] Both AppNexus and OpenX attempted to compete in the publisher ad server market but have exited the market to focus solely on programmatic ad serving.[175] Index Exchange and Pubmatic have not vertically integrated into other parts of the ad tech stack.[176]

183. As described below, providers of ad exchanges receive a percentage of publishers' payout ("take-rate" or "revenue share"). Different publishers can be charged different amounts. Different types of inventories transacted through exchanges also have distinct pricing formulas. For instance, Google prices display, video and app inventory differently.[177] Google also prices open auction, programmatic direct, private auctions, and programmatic guaranteed differently.[178]

184. In what follows, I define this relevant market using qualitative market evidence or practical indicia (Brown Shoe factors) and employing a hypothetical monopolist test. I then evaluate whether direct transactions and other ad tech tools should be included in the market for ad exchanges and find they

[redacted]

[173] Magnite, Inc., "Form 10-K for the Fiscal Year Ended December 31, 2023," 2024. pg. 3. https://investor.magnite.com/static-files/cb759e35-5d3a-4405-b871-3be0d8526e8e. ("key strategic objectives, industry growth rates for ad-supported connected television ("CTV") and the shift in video consumption from linear TV to CTV").
[174] Magnite. "Sellers" (undated). Accessed on May 9, 2024. https://www.magnite.com/sellers/; *See also,* Magnite. "Buyers" (undated). Accessed on May 9, 2024. https://www.magnite.com/buyers/
[175] Kevel. "OpenX Ad Server Alternatives" (December 19, 2018). Accessed on May 9, 2024. https://www.kevel.com/blog/openx-ad-server-alternatives
[176] Index Exchange. "One Exchange. Every Channel." (undated). Accessed on May 9, 2024. https://www.indexexchange.com; *See also,* Pubmatic. "Our Products" (undated). Accessed on May 9, 2024. https://pubmatic.com/products/
[177] GOOG-DOJ-AT -01826536 at -537. "Re: [Please read] ISBA/PwC Programmatic Study - Google preparation" (May 5, 2020). Internal email thread between [redacted] and [redacted]. ("We are very transparent on Open Bidding fees. These are set at 95:5 to the publisher for web Display inventory and 90:10 for Video and App inventory.")
[178] GOOG-NE-02643927 at -927. "2019 DVA Waffle: Buyside Fee, Rev Share, Net Rev % Media Spend" (October 1, 2019). [redacted]

advertisers in real time. In-app networks interact directly with mediation tools both on the publisher's and on the advertiser's side. This requires in-app networks to provide technical support to ensure this interoperability.

b) Publisher ad servers are not participants in the relevant market

219. As described in Section IV.C.1.a, publisher ad servers enable publishers to keep track and sell their ad inventory, with the goal of maximizing advertising revenue, whereas ad exchanges for transacting indirect open web display advertising are real-time auction marketplaces that enable ad buyers and sellers to match on a per-impression basis. Publisher ad servers and ad exchanges have distinct characteristics, use, and customers and are not substitutes for each other.

220. Google differentiates between publisher ad servers and exchanges. Between 2008 and 2018, Google marketed its publisher ad server and exchange as two separate and distinct products. Google also distinguished between its "ad serving software" and its exchange in its 10K SEC filing from 2008 to 2014. Only later did Google reclassify its ad-serving software revenues and blur the distinction between its publisher ad server and exchange in its shareholder reports under the GAM umbrella.[219] As I will show later in this report, Google has bundled its server and its exchange.

c) Ad tech that is part of WGP are not participants in the relevant product market

221. A limited number of publishers have the ability to build in-house ad servers rather than license a third-party ad server. In-house tools come with many challenges, such as technological challenges (i.e., mastering the technological expertise required to develop ad servers internally), and financial challenges (i.e., costs of building, maintaining, and training the workforce to use in-house ad servers). Only the very largest WGPs, such as Amazon and Facebook, are able to establish in-house ad servers.

222. These WGPs often internally determine what advertiser will permitted able to advertise on their properties. This is distinct from the functionality and task performed by an ad exchange for transacting indirect open web display advertising. While an ad exchange matches one of many advertisers to one of many publishers, WGPs select an advertiser. They don't play the role of an intermediary between different players on the sell- and buy-side but rather only match different advertisers to the WGP.

[219] Google Blog. "Introducing Google Ad Manager" (June 17, 2018). Accessed on June 5, 2024. https://blog.google/products/admanager/introducing-google-ad-manager/ ("[…] we broke away from the traditional constraints of "ad servers" and "SSPs" to build new programmatic solutions directly into the product we now call Ad Manager […] Ultimately, with Ad Manager, you get a complete ad platform that helps you earn more and grow revenue, no matter how you sell.")

365. Google's dominance also means that Google can collect a vast amount of data in a limited timeframe.[411]

366. I discuss below how Google's tying conduct further raises artificial barriers to entry in the market for publisher ad servers used for the sale of open web display advertising by allowing DFP to leverage from AdX's scale in the market for ad exchanges for transacting indirect open web display advertising. For example, in 2015, Google launched Reserve Price Optimization (RPO).[412] With RPO, Google's ad server was able to predict bidders' willingness-to-pay and dynamically adjust reserve prices by training its RPO model on AdX data.[413] DFP's data advantage allows it to implement algorithms that competitors cannot offer due to insufficient scale. RPO is also an example of how Google's algorithmic manipulation of auction inputs makes Google's take rate from publishers and pricing rules, more generally, less transparent to publishers.

4) The history of entry and exits is consistent with high barriers to entry

367. Since 2007, many new entrants in this market have failed or have been acquired. Table 4 below provides a timeline of entry and exits in the market. As shown in the graph, the most recent market entrant was in 2015. This lack of entry is an indicator of high barriers to entry.

Table 4

Timeline of entry and exits in the market for publisher ad servers used for the sale of open web display advertising

Ad Server (Company)	Entry	Exit
aQuantive (Microsoft)	2007	2012[414]
OpenRamp (OpenX)	1998[415]	2013[416]

[411] In his deposition, [redacted]

[412] GOOG-DOJ-15776523 and Google's First Am. Resps. and Objs. to Plaintiff's Third Set of Interrogs. (May 24, 2024) at 12.
[413] GOOG-NE-13204729 at -734. "AdX Dynamic Price" (August 17, 2015). Internal Google PowerPoint on RPO. (Slide explaining methodology on "How to Guess the Top Bid")
[414] CNN Money. "Microsoft's $6 billion whoopsie" (July 12, 2012). Accessed on May 10, 2024. https://money.cnn.com/2012/07/02/technology/microsoft-aquantive/index.htm
[415] AdButler. "Ad Networks vs Ad Exchanges: The History of Programmatic Advertising" (March 15, 2021). Accessed on May 2, 2024. https://www.adbutler.com/blog/article/ad-networks-vs-ad-exchanges-the-history-of-programmatic-advertising. ("OpenX began development as an open source ad server project in 1998")
[416] AdExchanger. "OpenX Confirms 'Lights Out' For OnRamp Ad Server" (February 12, 2013). Accessed on May 10, 2024. https://www.adexchanger.com/online-advertising/openx-confirms-lights-out-for-onramp-ad-server/

414. The conditions for competitive injury from tying are present in this case. Here, Google tied its AdX ad exchange with its DFP ad server. These are independent products with separate demand for each product. Google conditioned the use of AdX (the tying product) with the sale of its DFP ad server (the tied product). In earlier sections of this report, I showed that Google has monopoly power in both markets in which these products participate. As I show in Section VI.C., the result of this conduct is foreclosure of competition in the ad server market for open web display advertising, which enhanced and protected Google's monopoly power in this market and harmed publishers.

B. Timeline and functioning of Google's tying conduct

415. Since the early days of its exchange and ad server offerings, Google has engaged in a systematic effort to use its monopoly power in the exchange market to exclude competition in the ad server market. Google's tying conduct involved three of its AdTech tools at different time periods: Google's ad server (DFP), Google's ad exchange (AdX), and Google's ad-buying tool for small advertisers (AdWords, later Google Ads).

416. Google's systematic efforts to exclude competition and increase monopoly power in the ad server market followed the chronology below, which I explain in subsequent sections of this report:

a. In 2008, Google **automatically enrolled** advertisers using Google's ad-buying tool for small advertisers (AdWords, later Google Ads) to buy search advertising into using the same ad-buying tool to buy display advertising. This created a large and largely unique volume of advertisers using Google's ad buying tool for small advertisers to buy display advertising.

b. Around the same time, Google limited its ad-buying tool for small advertisers to Google's ad exchange (AdX), making Google Ads demand **exclusive** to AdX amongst exchanges, and leading publishers to consider AdX a "must-have" exchange.

c. Starting in 2009, Google imposed **technical limitations** preventing publishers using third-party publisher ad servers from selling to Google's ad exchange (AdX) in real-time open auctions.

d. Starting in 2016, Google **contractually tied** its ad exchange (AdX) and its publisher ad server (DFP), meaning that publishers wanting to access AdX demand in any form (in real-time or otherwise) were forced to sign a combined DFP-AdX contract.

remaining the "platform of choice" for publishers and developers.[516] For example, Google viewed The New York Times as one of their "most strategic publishers" and "getting access to all of the NYT's inventory" fulfilled Google's "own the tag" strategy.[517] In Google's view, having Google ad tags on publisher websites was essential so that Google could control the ad serving logic and ensure Google's demand sources (including Ad Words and DV360 through AdX) could bid on all publisher inventory.[518] Google's objective with this strategy was to control demand access to publishers' inventory and, in turn, set the terms of access for Google demand and third-party demand sources.[519] Google leveraged its market power in AdX to pursue this strategy.

429. Historically, publishers used multiple ad tags, each associated with a different demand source.[520] Google offered publishers two types of ad tags. The first, known as "AdX tags" (also referred to as AdX Direct Tags), enabled AdX to be called by third-party ad servers to serve an ad. When an AdX tag is placed on a publisher's website, the tag does not compete against other inventory in an auction. Rather, the AdX tag follows a binary operation that either serves an ad or does not serve an ad via AdX. AdX tags have no technical means to access real-time bidding on AdX.[521]

430. [redacted]

[516] GOOG-NE-12468547 at -557. "PBS Competitive Sessions Facebook & F8 2015" (April 2015). Internal Google presentation describing competitive threat from Facebook.
[517] GOOG-TEX-01230719 at -730. "The New York Times PBSx/BCDR Review" (February 2013). Internal Google presentation detailing The New York Times' deal with DFP.
[518] GOOG-NE-04442479 at -483, -493. "Header Bidding Observatory #2" (May 2017). Internal Google presentation detailing Header Bidding adoption.
[519] GOOG-DOJ-28420330 at -338. (May 23, 2017, *per metadata*). Internal Google document on how Google demand sources should respond to the growing trend of header tag implementation. ("Today, 'own the tag' means placing the Google Publisher Tag (GPT) on the page directly so Google owns the decision logic via DFP across all demand sources.").
[520] GOOG-NE-13507556 at -556. "Proposal: Making GPT 1st Tag on Page" (April 18, 2018). Internal Google proposal document. ("Publishers have increasingly been integrating 3rd-party ads-related tags on their pages (including header bidding wrappers, DMP tags, and more), and as a result, have lost control over the latency of their ad queries, the security of ads served to their users, and the usersyncing activity that occurs on their pages.")
[521] Deposition of [redacted]

434. By 2019, Google was intent on deprecating AdX Tags, which gave 3rd party ad servers access to AdX demand.[526] Thus, Google intended to remove even this subpar method of publishers accessing AdX demand using third party ad servers.[527] As a consequence, DFP's market share grew significantly from 2010 to 2016.

5) Google considered extending access to real-time AdX demand for third-party ad servers but decided not to pursue this option to maintain its exclusive access to real-time AdX demand

435. As early as 2009, Google had technology that allowed third-party ad servers to solicit bids in real-time from AdX in a way that benefited publishers. Google, however, elected not to bring that technology to market.

436. Starting in 2009, Google planned to extend access to AdX demand in real-time via Dynamic Allocation to third-party ad servers (or 3P-DA).[528] Although this rollout of 3P-DA was technically feasible and close to deployment for at least some locations,[529] Google decided not to fully launch this integration option to maintain its exclusive access to real-time AdX demand.

437. This rollout of 3P-DA was technically feasible according to Google: "Development of 3rd party Dart Enterprise dynamic allocation support is complete and scheduled for rollout in January."[530] In December 2009, an internal presentation, reproduced in Figure 11 below, described the implementation to be deployed in the following month, saying that the development of the third-party ad server uses an API to send AdX a minimum CPM to beat.[531]

Figure 11

Google Internal Description of how Third-Party Ad Servers would Access AdX in Real Time Starting January 2010[532]

[526] GOOG-DOJ-AT -01806366 at -369. "AdX Direct deprecation" (2019). Internal Google presentation for GTM Leads Meeting on Google's plan to deprecate AdX Direct. (Google presented a plan to deprecate AdX tags by "disable[ing] all means of calling Google demand that are relying on the Ad Exchange tag. This includes: Ad Exchange Tags called from a 3rd party ad servers")
[527] GOOG-NE-06828368 at -380. "Big Rocks: DFP/AdX/AdMob" (April 3, 2014). Internal Google document on the DFP/AdX unification. The document shows Google's intention to implement a strategy to deprecate AdX tags.
[528] In Section VII.B, I consider Dynamic Allocation more broadly as an ad server implementation that would allow real-time bidding via AdX and other ad exchanges; a technically feasible option that an independent ad server would want to implement.
[529] 3P-DA was in Beta version in 2012. GOOG-AT-MDL-017581528 at -588. "Display Strategy Working Document" (August 2012). Internal Google document discussing AdX growth, among other topics.
[530] GOOG-AT-MDL-B-004260508 at -522. "Partnership Discussion" (December 9, 2009). Internal Google presentation.
[531] GOOG-AT-MDL-B-004260508 at -522. "Partnership Discussion" (December 9, 2009). Internal Google presentation.
[532] GOOG-AT-MDL-B-004260508 at -522. "Partnership Discussion" (December 9, 2009). Internal Google presentation.

terms of service, that seems pretty bad."[546] In a 2013 email, Scott Spencer explained: "This was a strategic decision. We allow redirection from 3rd party ad servers, but not from other exchanges or yield managers. Why? Because if we did then those systems would immediately have a super set of demand – anything the SSP had + all of AdX (including AdWords). No one would sign up for AdX directly."[547] As Google summarizes in an internal presentation: "Yield managers can block our access. AdExchange Levels the Field."[548]

443. Google continued to consider enabling 3P-DA for custom ad servers.[549] "Publishers with customer ad servers will be able to dynamically call into AdX."[550] Drew Bradstock explained the impact of the launch would create greater spend on AdX, avoid custom ad servers pushing AdX down the priority, and increase penetration of markets and accounts.[551]

6) In 2016, Google contractually tied AdX and DFP

444. DFP and AdX are separate products. Publishers have separate demand for DFP and AdX, as evidenced by the usage of GPT (publishers using DFP) and AdX Tags (publishers using AdX, albeit in a limited manner). Prior to the contractual tie, some publishers wanted to access AdX without adopting Google's DFP, and DFP was used with exchanges other than AdX. Moreover, Google considered these ad tech tools separate even after the contractual tie.[552]

445. In addition, as described earlier, Google has monopoly power in the ad exchange market. For purpose of the contractual tie, AdX is the tying product. In Section VI.C, I describe how the contractual tie foreclosed competition in the tied market.

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[546] GOOG-DOJ-14248551 at -551. "Re: [adx-questions: 10197] TYM question" (March 22, 2013). Internal Google email shared by [redacted].
[547] GOOG-AT-MDL-008148529 at -530. "Re: AdX TOS effectively prohibits publisher from using an adserver?" (March 22, 2013). Internal email thread between Scott Spencer, [redacted].
[548] GOOG-AT-MDL-014598098 at -110, -116. "doubleclick ad exchange Intermediate Training" (undated). Internal Google training presentation.
[549] GOOG-DOJ-14234662 at -662. "3rd party dynamic allocation for non DFP/XFP clients" (December 15, 2011). Internal Google email from Drew Bradstock. ("Publishers with customer ad servers will be able to dynamically call into AdX.")
[550] GOOG-TEX-00074852 at -855. "DoubleClick Ad Exchange for Publishers" (undated). Google PowerPoint presentation on Dynamic Allocation.
[551] GOOG-DOJ-14234662 at -662. "3rd party dynamic allocation for non DFP/XFP clients" (December 15, 2011). Internal Google email from Drew Bradstock. ("Impact - Greater spend on AdX by pubs due to the resulting higher yields seen through dynamic allocation - Custom ad servers currently assign a flat rate to AdX's yield which is often far lower than the real number and pushes us down the priority – Penetration of markets and accounts with custom servers who would have been closed to us otherwise")
[552] GOOG-AT-MDL-000992438 at -438. "The Google Ad Manager (fka DRX) for Perf" (March 2022). Internal Google document describing Google Ad Manager. ("Google Ad Manager (internally and formerly known as "DRX") represents the merger of two flagship sell-side products: *DoubleClick for Publishers* ("DFP") and the *Google Ad Exchange* ("AdX"). The merger began in September of 2014 and concluded in mid-2018. We have now retired the DoubleClick brand, but internally, the products are still referred to as DFP and AdX.")

446. In 2014, Google began to combine DFP and AdX into a single offering, internally referred to as "DRX". By June 2016, Google made the Unified DFP/AdX Contract (DRX Contract), a contract for DFP and AdX, the default and prevented the creation of new AdX-only contracts.[553] Legacy AdX contracts remained legally valid post-June 2016 "unless terminated by Google, by the partner, or superseded by another AdX contract/ unified DFP/AdX contract."[554] A 2019 presentation summarized: "Google Ad Manager is the only way to access Google Ad Exchange as a publisher."[555] Rather than any benefit to publishers, Google's motivation for enacting the tie between AdX and DFP was to counteract a new source of demand that publishers could access outside of AdX, one that threatened to upend Google's highly effective own-the-tag strategy.

447. Google's decision to contractually tie AdX and DFP was intended to reduce the threat posed by Header Bidding to Google's ad server monopoly.[556] The rise of Header Bidding increasingly provided publishers with alternative sources of demand. Header Bidding also provided advertisers with an effective alternative route to DFP publisher inventory, outside of AdX. Between 2014 and 2018, Header Bidding increasingly posed a threat to Google's ad server monopoly and ability to funnel transactions to its exchange.[557] Google feared Header Bidding could evolve as an alternative inventory manager and remove DFP's control over publisher inventory.[558]

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[553] GOOG-DOJ-AT -01128809 at -823. "DRX* Contracting Guide" (September 21, 2020). External Google PowerPoint on DFP and AdX contracts. ("The Unified DFP/AdX Contract is the default contract (since June 2016) for both DFP (SB or Premium) and AdX. It is sometimes referred to as a DRX Contract."); *See also*, GOOG-DOJ-AT -01128809 at -828. "DRX* Contracting Guide" (September 21, 2020). External Google PowerPoint on DFP and AdX contracts. ("Legacy AdX Contracts are standalone AdX contracts that were used from 2011-2016. These contracts cannot be created since summer 2016, following the move to new unified contracts."); *See also* Deposition of [redacted], 183:13-184:24, Apr. 12, 2024 ("Q. …[I]t does look like it is a combined DFP and AdX contract that […] became effective in July 1st of 2016. Do you see that? A. Yes. […] Q. Do you know why Google was unifying contracts in 2016? A. It would have been for the same -- for the same -- for the combined DFP and AdX product.").

[554] GOOG-DOJ-AT -01128809 at -828. "DRX* Contracting Guide" (September 21, 2020). External Google PowerPoint on DFP and AdX contracts.

[555] GOOG-AT-MDL-001004706 at -728. "Ad Manager Ecosystem 101" (June 2019). Internal presentation introducing the ads ecosystem by gTech.

[556] GOOG-TEX-00089241 at -242, -243. "Re: The REAL Header Bidding Threat …" (October 15, 2015). Internal Google email thread with [redacted], and [redacted] ("Right now we are the defacto, preferred ad server of choice for 90% of publishers. […]In a world where (nearly) everything that currently happens in DFP today can be executed via RTB pipes, ad exchanges/SSPs really truly can replace the ad server […] By invalidating the need for an ad server we are setting the stage for Google to actually have to compete alongside the SSPs (or whatever these platforms are called then) for any access to any publisher inventory in the future. And we'll be disadvantaged at that point because, unlike our competitors, pubs have been viewing us as a necessary evil, instead of a responsive, innovative partner, so they are eager to figure out how to cut us out altogether. […] We need to preserve the importance of the ad server […]").

[557] See Section VII.B for a discussion of how Google protected its market power in the ad exchange market.

[558] GOOG-AT-MDL-013083978 at -988. "Header Bidding Double-Header Strat Review" (January 22, 2019). Internal Google presentation describing the future of client-side indirect demand in Ad Manager. ("Why address this now? -Universal Pricing Rules + First-Price Auction equalizes access for AdX and Open Bidders -But, it also lets pubs set floors based on HB line item prices. -Limits insight into header bidding if more logic moves client-side -Loss of control over auction rules, access to inventory -Sets publishers up to mediate us altogether"); *See also,* GOOG-TEX-00093865 at -868. "Re: rough new outline proposal for "Jedi++' presentation" (October 24, 2016). Internal email thread with [redacted], Jonathan Bellack, [redacted],

4) UPR harmed competition in the exchange market

490. In this section, I explain the competitive harm that Google's UPR strategy had on the exchange market. Specifically, I find that UPR gave AdX an advantage over rivals at the expense of publisher choice and ability to effectively monetize their inventory, and UPR led to more transactions through Google's ad-buying tools and exchanges at the expense of third parties.

a) UPR lowered floors on AdX

491. In this section, I analyze internal Google documents demonstrating how UPR dramatically lowered price floors on AdX.

492. Internal Google documents show how UPR impacted the price floors set by publishers. An internal presentation from September 2019 on the multiple changes that are happening in the Google ad tech stack includes a summary of the effect of UPR on price floors.[628] The presentation emphasizes that UPR led to "material reduction in effective floors" and states that new universal price rules set by the publishers are approximately [redacted] of what they were before the implementation of UPR.[629] Notably, it states that, for AdWords, the average publisher floor reduced from [redacted] after the implementation of UPR, leading to more than [redacted].[630]

493. Another internal Google presentation from December 2020 (Figure 14) on the sell-side auction quality optimizations provides a plot of the average floor for the U.S. matched queries for the months preceding and following the implementation of UPR.[631] The plot shows the average floor in terms of

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general, [Google has] the following options to deal with bid shading buyers: Ignore that it happens. Run simulations without incorporating any bid shading model, results will be that a lower reserve price always results in higher revenue. Downside is that the revenue for low reserve prices will be greatly overstated; Use the quality team's model, incorporating a model of how buyers change their bids as publishers lower or raise their prices, show whatever we get. This is the most accurate we know how to generate, but it will show graphs where we show higher revenue if the publisher raises their reserve prices, which we don't want. […]; Not make the chart available for every subrule. Surface it as an insight card when we think it's appropriate the way we do with other insights. In this case we can generate the data as in option 2, but not surface it to publishers if it suggests raising the reserve price would be beneficial. […]" The document concludes: "One proposal coming out of this discussion is to only show this graph only on opportunities where we suggest publishers lower their floors.")

[628] GOOG-AT-MDL-001977826 at -855. "Changes to Ad Manager, AdMob auction" (September 3, 2019). Internal Google PowerPoint on Ad Manager web inventory.

[629] GOOG-AT-MDL-001977826 at -855. [redacted].

[630] GOOG-AT-MDL-001977826 at -855. [redacted].

[631] GOOG-DOJ-AT -01516187 at -188. "Sellside auction quality optimizations" (December 9, 2020). Internal Google PowerPoint on auction floors, RPO, Optimized Pricing Rules, and DRS.

541. [redacted] is not the only publisher implementing this "House" strategy. The presentation takes a deeper dive into analyzing the House Ads trend in revenue and line items for [redacted]. It notes that while Header Bidding impressions and revenue decreased following the UPR launch, that trend was reversed as the publishers increased their usage of House Ads Line Items. The presentation concludes that "HA HB Circumvention goes against the spirit of UPR", that "HB usage, while dampened, has reverted and continues to grow," and that Google needs to manage "pubs desire for revenue diversification away from Google."[697] A Google employee working on this deck also expressed [redacted]."[698]

542. Google heavily scrutinized these circumventing strategies. Google employees explain that they "are watching […] pretty closely."[699] In February 2020, Google created a communication document to prevent publishers from "intentionally working around the unified floor price, potentially making more money in the short-term."[700]

543. Google took steps to shut down these circumventing strategies. A 2020 article explains that Google shut down the House tag as a way to prevent publishers from escaping UPR.

544. To conclude, UPR took place in Google's ad server. UPR harmed competition in the ad exchange market by giving AdX an advantage over third-party exchanges through lower floors and enabling AdX and Google's ad buying tools (DV360 in particular) to transact more impressions at the expense of third-party tools.

545. Google may argue that UPR simplified ad serving for publishers. As I have described above, Google's claim of simplified ad serving for publishers was pretextual and UPR actually created significant confusion and reduced ad serving quality. Moreover, with UPR, publishers had less choice and less ability to evaluate demand sources as publishers could no longer set per-ad buying tool floors.

546. While, as already noted, the ability to set reserve prices flexibly does benefit sellers, potentially to the detriment of advertisers, and, thus, this potentially represents a transfer from one consumer group to

[697] GOOG-AT-MDL-008107072 at -086. "Analysis of Demand Not Subject to UPR" (November 2019). Internal Google PowerPoint on publishers circumventing UPR.
[698] GOOG-AT-MDL-008107072 at -073. "Analysis of Demand Not Subject to UPR" (November 2019). Internal Google PowerPoint on publishers circumventing UPR.
[699] GOOG-DOJ-AT -00175537 at -538. "Re: DotDash UPR Circumvention" (September 26, 2019). Internal email thread between [redacted], and others. ("We are watching [redacted] pretty closely and wanted to show you an example of what we thing is an example of this (but we are not sure).").
[700] GOOG-DOJ-AT -02277330 at -331. "PR Comms Doc: Policy Changes for Ad Manager Line Items" (November 20, 2019). Internal Google PR document on how to communicate about UPR circumvention.

another. As publisher ad server providers compete for publishers and not advertisers, a competitive provider would be expected to act in the interests of publishers and, therefore, not impose restrictions that benefit them. In this regard, even if there were evidence that such restrictions assisted other customers of Google, this would not counter the intent and effect of Google's conduct here that arose jointly out of its market power in ad servers, its vertical integration throughout the ad tech stack and the benefits it received from steering and subverting the ability of publishers to exercise competitive choice amongst ad exchanges. I am unaware how UPR could reduce total surplus to all consumers. If Google suggests any further benefits of UPR, I plan to evaluate such claims.

B. Google introduced Dynamic Allocation in a way that impaired real-time competition between exchanges, increased transactions on AdX, and increased its monopoly power in the exchange market

547. The second change to ad server operations implemented by Google came with the way they implemented Dynamic Allocation (DA). DA refers to the way Google offered inventories to exchanges and other intermediaries that impeded competition in the ad exchange market. When initially implemented by DoubleClick, before its acquisition by Google, represented an improvement over previous sequential processes by which the ad server called ad networks which did not bid in real time known as the Waterfall. The Waterfall process led to publishers missing out on more valuable ad inventory allocation.

548. In its implementation of DA after the acquisition of DoubleClick, Google made and maintained critical choices with the intention of steering inventory to its AdX exchange compared to other intermediaries, without providing benefits to publishers. Those choices were:

- AdX was afforded a right of first refusal on publisher's non-guaranteed inventory. This meant that AdX was offered the opportunity to submit a live bid on each impression; if AdX did not win the impression, only then was it offered to third-party exchanges in the Waterfall.

- For many years, the DA afforded AdX a 'last look' advantage that other intermediaries did not receive. When bidding against exchanges bidding through Header Bidding, last look increased AdX's probability of winning the impression.

549. These actions were primarily motivated by Google's desire to maintain an information advantage over other exchanges in its ability to match high demand impressions with advertisers willing to pay high prices. Publisher use of the more costly-to-implement approach, Header Bidding, demonstrates that

publishers wanted exchanges to compete for their impressions simultaneously. Google's eventual move to Exchange Bidding illustrates aspects of the counterfactual that would have arisen had Google not been integrated across the ad tech stack.

550. The antitrust harm arising from these actions has the same economic structure as the harm identified with respect to UPR analyzed in the previous section. Specifically, if Google were operating without monopoly power in ad server tools and was not integrated into ad exchanges, Google would not have had the ability to use restrictions of DA to impede competition amongst all exchanges for publisher ad inventory as this would have led to publishers adopting ad server tools of other providers. In addition, had Google not been vertically integrated into the exchange market, it would not have had the incentive to use its market power in the ad server market to steer transactions towards its own ad exchange, AdX. Thus, comparing the factual (how Google implemented DA) with the counterfactual (that would have arisen had Google either not had monopoly power in ad servers or had not used that monopoly power to favor its own ad exchange), it can be seen that the way Google chose to implement DA harmed competition in the exchange market.

551. The following discussion will present evidence relevant to Google's conduct with respect to DA, the choices it faced, its intent when making those choices, and evidence that this resulted in the predicted harm to competition in the exchange market.

1) DoubleClick's DA before the acquisition by Google

552. DoubleClick launched its ad exchange in 2007 before Google acquired it in 2008.[701] Along with the exchange, DoubleClick also launched a feature called Dynamic Allocation.[702] At the time, DA was

[701] Google Official Blog. "We've officially acquired DoubleClick" (March 11, 2008). Google Official Blog. Accessed on May 30, 2024. https://googleblog.blogspot.com/2008/03/weve-officially-acquired-doubleclick.html
[702] Google's First Am. Resps. and Objs. to Plaintiff's Third Set of Interrogs. (May 24, 2024) at 11. *See also* DoubleClick. "DoubleClick Advertising Exchange" (undated). Accessed on May 30, 2024. https://web.archive.org/web/20071001100309/http://www.doubleclick.com/products/advertisingexchange/index.aspx ("DoubleClick's proprietary Dynamic Allocation system sells inventory through the channel that pays the highest price, in real time.").

part of DoubleClick's ad server logic[703] used to "determine what inventory to allocate to the Exchange"[704] to solicit bids in "real-time."[705]

553. When DA launched, DoubleClick's ad server followed a Waterfall process to determine which ad network would purchase the impression. Ad impressions are routed to demand sources via a Waterfall method.[706] The Waterfall method is a sequential auction process where the ad server evaluates the line items for each demand source eligible to serve the impression, such as a direct deal or ad network, in a pre-determined priority order. Ad networks could not run real-time auctions. Upon receiving a request, an ad network responds to the ad server whether it will purchase the impression or not. Demand partners with little bid history had a low chance of winning the impression.

554. Publishers set the priority order for each line item based on negotiated deals, historical CPM performance, or some other measure. The demand source with the highest historical CPM would get the first bite at the impression, and if the demand source could not clear the floor price, then the impression would be routed to the demand source with the next highest historical CPM. Along with setting the priority, the publisher also indicates the net CPM value each line item would be willing to pay for an eligible impression. Publishers typically determine the net CPM based on estimates of what the impression is worth or pre-determined deals with the demand partner.

555. For each line item, the ad server determined if it was eligible to fill an impression. The ad server followed the Waterfall process to evaluate the price each would pay for the impression.[707] Once the ad server identified an eligible line item that can purchase the impression at a net CPM that clears the publisher's price floor, the Waterfall process concluded, and the demand source was selected to serve the impression. See Figure 22 below for a model of the Waterfall auction process.

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[703] GOOG-NE-07798164 at -167. "Re: 1P Auction GTM narrative – Last Look concerns" (February 28, 2019). Email discussing narrative around shift to 1P auction. ("What I would absolutely like to convey is that our ad serving logic is changing and that it's changing in a way we believe it promotes fairness. Non-guaranteed line items used to be able to act as a second price in the Ad Manager auction but could not be 2nd priced themselves – this was the foundation of making indirect demand ad serving choices (dynamic allocation) and this is changing.")

[704] DoubleClick. "DoubleClick Advertising Exchange" (October 18, 2007). Accessed on May 30, 2024. https://web.archive.org/web/20071018015601/http:/www.doubleclick.com/insight/pdfs/dc_adxoverview_0704.pdf

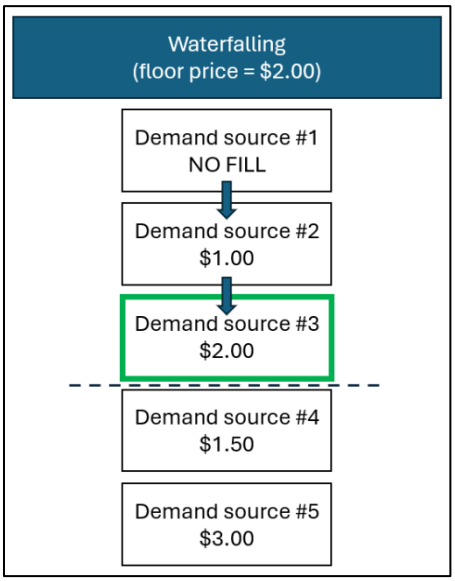
[705] DoubleClick. "DoubleClick Advertising Exchange" (undated). Accessed on May 30, 2024. https://web.archive.org/web/20071001100309/http://www.doubleclick.com/products/advertisingexchange/index.aspx

[706] ClearCode. "What's the Difference Between Waterfall Auctions & Header Bidding?" (February 5, 2024). Accessed on May 30, 2024. https://clearcode.cc/blog/difference-waterfall-header-bidding/#:~:text=The%20by%2Dproduct%20of%20this,impressions%20are%20(hopefully)%20sold ("The by-product of this was the waterfall auction – also known as daisy-chaining or waterfall tags. In this process, a publisher passes its inventory from ad network to ad network in descending order of importance until all impressions are (hopefully) sold.")

[707] Deposition of Scott Spencer (Project Manager, Google), 33:3-33:13, August 12, 2021. ("Q. What is a waterfall? A. A waterfall isn't an auction at all. […] For ad tech a waterfall refers to the process whereby a network is called, the network sees if it has a bid for a buyer of the particular inventory, and if not, calls another network that would then see if it has a buyer for the inventory. And if not, it would call another network or system or whatever.")

Figure 22

Model of the Waterfall auction process



556. While the winning demand source, Demand Source #3, cleared the $2.00 price floor, the Waterfall process doesn't select a higher-paying demand source. Demand Source #5, which was ranked lower than Demand Source #3, was willing to pay more than Demand Source #3 but was never considered by the publisher ad server for the impression.

557. DA, as first implemented by DoubleClick, employed a real-time bidding auction process to limit the scenario described above from happening by giving its ad exchange the opportunity to run a real-time auction for eligible impressions. At the time that DoubleClick developed DA, the demand sources in the Waterfall were networks. Rather than running a real-time bidding auction and returning a live bid, networks simply purchased or did not purchase the impression when called in the Waterfall.

558. DA, both as first implemented by DoubleClick and later by Google's DFP, shared the highest net CPM value determined by the Waterfall process with AdX as a price floor to beat.[708] AdX buyers then bid

[708] DoubleClick Ad Exchange (undated). "Profiting from Non-Guaranteed Advertising: The Value of Dynamic Allocation & Auction Pricing for Online Publishers" p.3. [White Paper]. https://web.archive.org/web/20170830013310/http:/static.googleusercontent.com/media/www.google.com/en/us/adexchange/DC_Ad_Exchange_WP_100713.pdf ("Dynamic allocation passes to the Ad Exchange the CPM value associated with the ad that the primary ad server has selected and is about to serve. The technology then uses this CPM value as the minimum CPM for the auction.")

in real-time for the impression, and if an AdX buyer could clear the price floor, the buyer would win the impression over the demand source selected by the Waterfall process.[709]

559. Ad serving logic powers the ad selection process for a publisher ad server. To understand how DA manipulated DFP, it is useful to explain how DFP's ad selection process was designed.

560. When a user accessed a website, the incoming impression triggered an ad request to DFP to fill available ad slots. Specific information about the user and the device is shared in the ad request, enabling DFP to create a "list of all line items matching the targeting criteria."[710]

561. As Google explains, "if the request comes from a man in California using Linux:

- A line item or yield group[711] targeting Men in California is on the list;
- A line item or yield group targeting Men in California on Windows is not on the list;
- A line item or yield group targeting Men in Vermont is not on the list."[712]

562. If the publisher ad server determined the incoming impression was not cleared by a guaranteed line item, the impression became available to AdX and lower-priority remnant inventory.[713]

563. DFP's ad selection process determined whether non-guaranteed line items were eligible to serve an incoming impression. Of those line items, DFP selected the highest CPM line item, and DA shared that with AdX as the price floor. AdX then ran a real-time auction among its own buyers, and the highest AdX

[709] Declaration of Nitish Korula (Engineering Director, Google), Paragraph 32, August 4, 2023. ("Using Dynamic Allocation, DFP established a "floor price" for AdX bids to beat, based on the highest price of any of the publisher's eligible booked, static remnant line items (which a publisher could configure based on the estimated price of each remnant line item or a fixed price the publisher had negotiated with a particular remnant demand partner). AdX buyers would then submit real-time bids to try to beat this floor.")
[710] Google Ad Manager Help. "Ad selection white paper" (undated). Accessed on May 30, 2024. https://support.google.com/admanager/answer/1143651?hl=en&ref_topic=7506292&sjid=10501155603162982449-NC#an-ad-request-passes-information-to-the-ad-server
[711] Google describes yield groups as a way for publishers to specific targeting criteria for AdX, Open Bidding, and or mediation for mobile apps. *See,* Google Ad Manager Help. "Create and manage yield groups" (undated). Accessed on May 30, 2024. https://support.google.com/admanager/answer/7390828?hl=en ("Yield groups allow you to specify what inventory you want to sell with Ad Exchange, Open Bidding, or mediation for mobile apps.")
[712] Google Ad Manager Help. "Ad selection white paper" (undated). Accessed on May 30, 2024. https://support.google.com/admanager/answer/1143651?hl=en&ref_topic=7506292&sjid=10501155603162982449-NC#an-ad-request-passes-information-to-the-ad-server
[713] GOOG-NE-11926658 at -708. "Display Ecosystem Boot Camp" (undated). Internal presentation from DoubleClick Ad Exchange by Google. ("DFP goes through its normal ad selection process, ignoring AdExchange for now. If it selects an ad booked at a priority at or below AdX, an AdX auction is triggered.")

bidder would win if it cleared the floor price.[714] If not, the impression was sold to the highest paying, directly booked, non-guaranteed ad.

564. For example, consider line items on DFP to be ads the publisher can serve to an incoming impression. The price the advertiser will pay (or the price the publisher expects the advertiser will pay) if the ad is served is listed as the CPM for that line item, and the advertiser's targeting criteria for these ads, such as the type of device or location of the impression, is included with the line item as well. Publishers prioritize these line items based on various factors, including delivery terms agreed upon with the advertisers (e.g., guaranteed or non-guaranteed ads) and CPM. Thus, when an incoming impression matches the targeting criteria of the line items, DFP selects the most eligible line item to serve the impression based on the publisher's inputted prioritization.

565. If the impression matches the targeting criteria for a non-guaranteed line item (i.e., an ad that has offered to pay a certain CPM, or the publisher has an estimate of the CPM the advertiser pays on average but does not have contractual delivery terms), DFP should select that line item to serve the impression.

566. DA kicks in at this point to give AdX an opportunity to bid in real-time on the impression, using the CPM of the line item that would serve the impression as a price floor. If AdX can secure a higher bid for the inventory than the line item selected by DFP, it will serve the impression.

2) Google's DA harmed competition in the exchange market

a) DA after the take-off of real-time bidding

567. RTB technology was developed in the early 2010s and presented an opportunity to alleviate the problems of the Waterfall process. According to Google, real-time bidding allows an ad exchange, like AdX, to send a buyer "information about an impression as it's happening. The buyer analyzes it, then returns a bid and ad tag[715]" to be submitted to the overall auction.[716] Yield management[717] companies,

[714] DoubleClick Ad Exchange (undated). "Profiting from Non-Guaranteed Advertising: The Value of Dynamic Allocation & Auction Pricing for Online Publishers" 2010. DoubleClick by Google. p.3. [White Paper]. https://web.archive.org/web/20170830013310/http:/static.googleusercontent.com/media/www.google.com/en/us/adexchange/DC_Ad_Exchange_WP_100713.pdf ("The CPM value associated with the ad that the primary ad server has selected and is about to serve. The technology then uses this CPM value as the minimum CPM for the auction. If the Ad Exchange can provide the publisher with a net CPM value higher than they would have gotten from delivering their directly booked, non-guaranteed ad, the Ad Exchange will deliver an ad. If, however, the directly booked ad's CPM value is higher, it ignores any bids coming in from the Ad Exchange.")

[715] Deposition of [redacted]

such as AdMeld, started to capitalize on the opportunity to offer publishers RTB services to manage their inventory yield around 2010.

568. After this RTB technology became widespread in display advertising around 2010, ad exchanges progressively replaced ad networks as the intermediary competing for impressions via the Waterfall. When called by the ad server, an exchange runs a real-time auction. At that time, DA no longer represented the innovation first introduced by DoubleClick. Instead, Google's ad server refused to provide publishers with the ability to solicit simultaneous live bids from multiple exchanges or at least the choice of how to rank exchanges to solicit live bids from. DA allowed AdX to always have an opportunity to transact an impression, even if a rival exchange might have offered a better price to the publisher. DA also afforded AdX with a last look by granting AdX information about rivals' historical performance to conduct its auction.

569. DA allowed AdX, and only AdX, to compete in real-time against all non-guaranteed inventory, which was priced at a historical, average price, not a live auction price.[718] Google's 2010 announcement described how its ad server let its ad exchange compete in real-time against the other exchanges' static prices.[719] As publishers have shared, DA and the lack of real-time bidding for all demand partners on DFP led to the rise of Header Bidding.[720] Google understood that publishers were harmed by this feature of DA and that Header Bidding was the result of publishers seeking better prices.[721]

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[716] GOOG-NE-11926658 at -688. "Display Ecosystem Boot Camp." (undated). Internal presentation from DoubleClick Ad Exchange by Google. ("An AdX feature is whereby AdX sends a buyer information about an impression as it's happening. The buyers analyze it, then returns a bid and ad tag to be submitted to the overall AdX auction.")
[717] GOOG-NE-11926658 at -677. "Display Ecosystem Boot Camp." (undated). Internal presentation from DoubleClick Ad Exchange by Google. ("Yield manager: a third party which manages buyers like ad networks on behalf of a publisher. Its goal is to increase overall yield for the publisher by allocating the publisher's available impressions among each buyer in an optimal fashion.")
[718] GOOG-NE-08112779 at -794. "PBS Basics Training (3) AdX Basics" (undated). Google internal presentation.
[719] Google (undated). "Maximizing advertising revenues for online publishers". [White Paper]. https://static.googleusercontent.com/media/www.google.com/en//googleblogs/pdfs/revenue_maximization_090210.pdf ("Through integration with DFP it can "dynamically allocate ads. Dynamic allocation is a unique technology that works by passing to the Ad Exchange the CPM value associated with any non-guaranteed ad that DFP is about to serve.")
[720] AdExchanger. "The Rise Of 'Header Bidding' And The End Of The Publisher Waterfall" (June 18th, 2015). Accessed on May 30, 2024. https://www.adexchanger.com/publishers/the-rise-of-header-bidding-and-the-end-of-the-publisher-waterfall/ ("Among the boosters of header bidding, this close tie-in between two Google platforms is sometimes viewed as an obstruction to progress. Once they integrate with AdX, publishers can get better yield by enabling the "dynamic allocation" and "enhanced dynamic allocation" features, which give AdX a chance to beat other demand in the ad server, even if it's not its turn."); *See also,* Digiday. "An ad tech urban legend": An oral history of how header bidding became digital advertising's hottest buzzword (June 16, 2017). DigiDay. Accessed on May 30, 2024. https://digiday.com/media/header-bidding-oral-history/ ("Fed up with how Google's ad server favored its own exchange, over the past two years many publishers restructured their tech stacks to simultaneously offer inventory to multiple exchanges before making their ad calls.")
[721] GOOG-DOJ-27769247 at -268. "Header Bidding and FAN" (September 2, 2016). Internal Google presentation. Slide describing the functioning of Dynamic Allocation titled "Inefficient workflow led to the rise of Header Bidding." ("Pubs losing money here – want better pricing and "auction of auctions" giving rise to Header Bidding.")

d) DA allowed AdX to transact more impressions and drove publishers to adopt Header Bidding

584. Around 2014, publishers began to experiment with a new approach to overcome the Waterfall and real-time bidding issues posed by Google. Publishers, other industry participants and even Google saw Header Bidding as a response to Google's DA which preferentially routed inventory to Google's exchange at the expense of publisher yields.

585. In an internal memo, Google senior engineers explained that "Header bidding was developed as a reaction to EDA. HB allows external buyers to compete with DFP line items on the basis of actual CPMs with all other demand in one flat auction at the time of decision making – this was previously only possible for GDN via EDA. The main benefit to publishers from header bidding is increased revenue, due to actual vs. average CPM bid competition in between line items and EDA."[739]

586. Industry participants also linked the rise of Header Bidding to Google's DA. Ryan Christensen, General Manager at AppNexus, stated, "We believe the reason pre-bid is taking off is because of DFP dynamic allocation."[740]

587. The creation of Header Bidding increased head-to-head competition for publishers' ad inventory. The flexibility and features of Header Bidding made it appealing to publishers by providing them with more transparency and control than the Waterfall process and by guaranteeing better yield management. The industry started adopting Header Bidding and departed from DA and sequential calling of exchanges.

588. By 2015, many SSPs and DSPs (such as AppNexus, OpenX, Rubicon, Criteo, Index Exchange, etc.)[741] had Header Bidding implementations that allowed them to bid on publishers' sites. Google remained a notable exception. In a 2015 email thread discussing Google's response to Header Bidding, some employees propose that Google should just please publishers and "allow for all sources of demand to compete fairly, in real-time (or as close to real-time) as possible."[742]

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[739] EDA refers to Enhanced Dynamic Allocation, which I discuss later in this section. GOOG-NE-06724126 at -126. "A buy-side perspective on Header Bidding (HB)." (September 2016). Google internal strategy document on Header Bidding.
[740] AdExchanger. "AppNexus Dusts Off Header Bidding Product as Publishers Clamor to Unify Demand" (August 3rd, 2015). Accessed on May 31, 2024. https://www.adexchanger.com/platforms/appnexus-dusts-off-header-bidding-product-as-publishers-clamor-to-unify-demand/
[741] AdExchanger. "AppNexus Dusts Off Header Bidding Product as Publishers Clamor to Unify Demand" (August 3rd, 2015). Accessed on May 31, 2024. https://www.adexchanger.com/platforms/appnexus-dusts-off-header-bidding-product-as-publishers-clamor-to-unify-demand/; Ad Ops Insider. "Header Bidding Implementations in the Wild" (November 16, 2015). Accessed on May 31, 2024. https://www.adopsinsider.com/header-bidding/header-bidding-implementations-in-the-wild/2/
[742] GOOG-TEX-00116076 at -077. "Re: Fwd: The Rise Of 'Header Bidding' And the End Of The Publisher Waterfall | AdExchanger" (June 23, 2015). Internal email thread.

greater flexibility. Since DFP gives AdX a right of first refusal to trade high-value impressions, EDA gave AdX an advantage.

633. With EDA, Google exposes all guaranteed inventory to AdX.[809] Google states there is no delivery risk with EDA, as EDA will create high temporary CPMs when guaranteed line items are behind schedule.[810] Google touted this program as a way for publishers to increase yield by introducing a threshold below the EDA temporary CPM and above the guaranteed line item price.[811]

C. Google restricted publishers' use of line items in order to suppress the adoption of Header Bidding

634. The third way in which Google impaired the use of its ad server products was by imposing restrictions on "line items" to limit the use of Header Bidding by publishers. Line items were ad server settings that publishers used in order to customize their ad servers, most notably to enable Header Bidding. As explained previously, Header Bidding was a key facilitator of competition for the inventory between AdX and third-party exchanges. Google imposed restrictions on the number of line items publishers could use ("line item caps"), in an effort to limit the adoption of Header Bidding.

635. In this section, I present my analysis of the effects of Google's line item caps. I find that: (a) Google's monopoly power in the ad server market gave it the ability to impose restrictions on line items, and (b) Google's vertical integration between the ad server and exchange market gave it the incentive to impose restrictions to favor AdX. In the absence of either monopoly power or vertical integration, Google would have been compelled by competitive forces to develop and maintain product features that gave publishers the most value. More specifically, facilitating competition in the adjacent ad exchange market would have been a profit-maximizing strategy for Google if it considered solely the ad server market, as this competition would have generated more value for publishers, from which Google could have then benefited through ad server sales. However, Google's vertically integrated ad server and exchange businesses changed its incentives; it did not prioritize maximizing profit in the ad server market but rather sought to leverage its power in the ad server market and degrade its services to publishers in order to advantage itself in the exchange market. Instead of facilitating competition in the ad exchange market and

[809] GOOG-AT-MDL-004288583 at 592. "Yield Management in Google Ad Manager" (July 2018). Internal Google presentation. ("Expose to AdX all inventory that you choose to sell programmatically by targeting it on AdX Line Items; this wil enable Dynamic Allocation (DA).")
[810] GOOG-TEX-00082986 at -986. "Enhanced Dynamic Allocation V3" (undated). Google internal design document. ("In EDA V3, we suggest that the eda_price should not exceed a cap even if the reserved ad is behind its schedule.")
[811] GOOG-AT-MDL-004232442 at -447. "Increased Overall Yield with Optimized Competition (BETA)" (undated). Internal Google presentation. ("The chosen floor is always at least as great as the line item CPM of the competing line item and at least as great as any applicable AdX open auction pricing rule.")

providing more value to publishers, Google imposed restrictions on line items, which degraded the value to publishers in the ad server market and significantly reduced competition in the ad exchange market.

636. I am unaware of an explanation of how line items restrictions can be procompetitive or in publisher interests. If Google suggests procompetitive benefits, I plan to evaluate such claims.

637. In the remainder of this section, I explain Google's conduct and intentions with respect to line item caps and the resulting anticompetitive effects.

1) Functioning of line item caps

638. A Header Bidding auction takes place on the website visitor's browser as the page loads and the winning bid is then relayed to the publisher ad server to complete the ad-serving process. Successful communication between the publisher ad server and the Header Bidding auction requires the use of "line items."[812] In the most basic sense, line items are ad server settings, specified by the publisher, that specify all of the details relevant to showing an ad to website visitors, including the space available for the ad and the details about what kind of ad campaign could be shown. Line items are also used to translate the bid values from the Header Bidding auction into values the ad server can recognize. Line item values take on a value of 1 (corresponding to a true or valid value) or 0 (where the value is false or invalid). For example, a $2.00 bid will translate into a value of 1 for a line item corresponding to a $2.00 bid on the publisher ad server. Then, the $2.00 line item will be processed on the publisher ad server.

639. The publisher must specify each line item for the ad server.[813] Thus, if a publisher expects bids to fall between a range of $0.01 and $20.00 and wants line items available in increments of $0.01, the ad server owner needs to setup thousands of individual line items established on the publisher ad server.[814] This was time consuming and required specialized technical knowledge do to. Managing this today remains time intensive and complex.[815]

640. Publishers' benefit from a high granularity when setting up line items. If a publisher sets line items from $1 to $10 in $1 increments, it would interpret a bid for $1.99 as $1 and hence end up selling

[812] Prebid. "Introduction to Header Bidding" (undated). Accessed on June 2, 2024. https://docs.prebid.org/overview/intro-to-header-bidding.html ("[...] need to set up line items within the ad server for all ad units that are part of the header bidding auction.").
[813] Prebid. "Introduction to Header Bidding" (undated). Accessed on June 2, 2024. https://docs.prebid.org/overview/intro-to-header-bidding.html
[814] Search Engine Journal. "What is Header Bidding And How To Implement It" (December 22, 2022). Accessed on June 2, 2024. https://www.searchenginejournal.com/header-bidding/389013/#close ("you would need to build line items in GAM with certain granularity, say 0.01 – and for the CPM range $0-$20, you would need to create 2,000 line items, which are impossible to do manually.").
[815] Conversation with Prof. John Chandler, June 4th, 2024.

outright for the largest publishers and sometimes only partially granted. These denials show a concerted effort by Google employees to prevent publishers from realizing the procompetitive benefits of Header Bidding and decreased publisher yield.

D. Google redacted key publisher data fields in order to suppress the adoption of Header Bidding

677. The fourth way in which Google restricted the operation of ad servers and ad server tools was in its choice to redact information. Google redacted valuable information that enabled publishers to evaluate and compare the performance of their inventory across different exchanges. Specifically, Google removed critical information from databases provided to publishers through DFP, rendering it impossible for publishers to know how much bidders on different exchanges were bidding for particular ad inventory, and impossible to evaluate the relative performance of exchanges more generally. Deleting this data for publishers, therefore, harmed competition amongst exchanges, as publishers simply could not evaluate their options of where to sell their inventory without this information. As with the other three anticompetitive conduct related to the operation of Google's product in the ad server market analyzed in this section, Google only made such redactions because Google had monopoly power in the ad server market and was vertically integrated into the exchange market. Google's monopoly power and vertical integration gave it both the ability and the incentive to redact valuable data that would otherwise be available to publishers and enable greater competition amongst exchanges. Thus, this conduct harmed competition, specifically the ability to compare prices across exchanges, and harmed publishers' operations.

678. I am unaware of how data redaction can be procompetitive. If Google suggests procompetitive benefits, I plan to evaluate such claims.

679. This section presents evidence documenting Google's conduct, intention, and impact on competition and publishers in the exchange market.

1) Google's data redactions

680. Publishers need detailed transaction data in order to understand the auction's operations, including bid amounts and how winning bids are determined, set reserve prices, and to monitor their financial performance across exchanges. Without this information, publishers have no ability to verify the

operations of an auction, compare performance across exchanges, or value their ad inventory.[867] In order to meet publisher needs, Google provides publishers with two types of data files: Data Transfer files and Bid Data Transfer files.[868]

681. Data Transfer files (or DT files) include nine different files related to requests, impressions, bids, clicks, etc.[869] These files present records of bids from both AdX and non-Google supply-side platforms that participate in Open Bidding, as well as bidding data for DSPs who bid through DFP and Open Bidding.[870] Those files, however, do not contain bids that come from Header Bidding auctions.

682. By contrast, the Bid Data Transfer files (or DBT files) include the bids of Header Bidders and the bid prices, including that of the winning bidder.[871] Both files included a "KeyPart" field[872] that publishers could use to link impressions across both files prior to 2019.[873] As explained below, this field was essential for publishers to be able to compare bids and outcomes of Header Bidding with outcomes other exchanges.

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[867] GOOG-NE-06879032 at -033. "Data Transfer - Breaking Joinability to comply with Amazon contract" (June, 2019). Internal Google document on data transfer file structure. ("For example, the bid files strictly contain data related to the bids (price, buyer, etc.), but the publisher can retrieve full context of inventory and delivery attributes by joining with other files. For example:
• What were average bid prices for ads with pos = top (using Key Values).
• What was the bid distribution on iphone for a specific ad unit (using Device, Ad Unit etc)
• What were the auction dynamics for mobile users during the election in Ukraine? (using Country, device)")

[868] Google Ad Manager Help. "Ad Manager Data Transfer reports" (undated). Accessed on June 3, 2024. https://support.google.com/admanager/answer/1733124?hl=en#zippy=%25252Cabout-the-data-contained-in-data-transfer-files%25252Chow-files-are-delivered%25252Cfile-names%25252Cdata-transfer-files-in-the-ad-request-process%25252Cstore-files-locally%25252Clearn-about-the-bigquery-data-transfer-service%25252Cmake-large-data-transfer-files-easier-to-process%25252Cdownload-a-sample-file%2Cabout-the-data-contained-in-data-transfer-files%2Cdownload-a-sample-file%2Chow-files-are-delivered%2Cfile-names%2Cdata-transfer-files-in-the-ad-request-process%2Cstore-files-locally%2Clearn-about-the-bigquery-data-transfer-service%2Cmake-large-data-transfer-files-easier-to-process

[869] GOOG-NE-06879032 at -033. [redacted]

[870] Google Ad Manager Help. "Ad Manager Data Transfer reports" (undated). Accessed on June 3, 2024. https://support.google.com/admanager/answer/1733124 ("The NetworkBackfillBids file includes details about every Open Bidding and Authorized Buyers bid for your inventory, whether the bid won the auction or not.")

[871] Google Ad Manager Help. "Ad Manager Data Transfer reports" (undated). Accessed on June 3, 2024. https://support.google.com/admanager/answer/1733124 ("NetworkCodeServes NetworkBackfillCodeServes | Records every response from Ad Manager, whether downloaded or not."); See also GOOG-AT-MDL-012840947 at -972. "'Trust me, I'm Fair": Analysing Google's Latest Practices in Ad Tech From the Perspective of EU Competition Law" (October 7, 2019). Discussion paper from Damien Geradin and Dimitrios Katsifis on Google's ad tech practices. ("… Data Transfer file includes information on an impression-by-impression basis, e.g. at which price an impression was sold, and to which buyer, as well as the bids of header bidding partners.")

[872] Google Ad Manager Help. "Ad Manager Data Transfer reports" (undated). Accessed on June 3, 2024. https://support.google.com/admanager/answer/1733124?hl=en#zippy=%25252Cabout-the-data-contained-in-data-transfer-files%25252Chow-files-are-delivered%25252Cfile-names%25252Cdata-transfer-files-in-the-ad-request-process%25252Cstore-files-locally%25252Clearn-about-the-bigquery-data-transfer-service%25252Cmake-large-data-transfer-files-easier-to-process%25252Cdownload-a-sample-file%2Cabout-the-data-contained-in-data-transfer-files%2Cdownload-a-sample-file%2Chow-files-are-delivered%2Cfile-names%2Cdata-transfer-files-in-the-ad-request-process%2Cstore-files-locally%2Clearn-about-the-bigquery-data-transfer-service%2Cmake-large-data-transfer-files-easier-to-process

[873] GOOG-NE-06879032 at -033. [redacted]

721. At a high level, Bernanke did the following: When GDN submitted the top 2 bids on AdX, effectively second-pricing itself, Bernanke raised the 14% GDN revenue share . Google created a "pool" (akin to a bank account, albeit one that publishers did not know about or control) for each publisher with the excess funds from Bernanke to inflate bids from GDN in future auctions where GDN did not submit the winning bid by taking a lower buyside revenue share.[909]

722. Rather than collecting a 14% revenue share,[910,911] on high demand impressions Bernanke lowered the revenue share and enabled GDN to use the pool of excess funds to inflate the GDN bid "to allow advertisers to win even more AdX auctions."[912] As Google explained, when Bernanke was launched, the cost from draining the pool of excess funds would be balanced "by increasing the revshare on other auctions by lowering GDN's second bid (which is used to second-price GDN sometimes)."[913]

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[907] GOOG-AT-MDL-004248075 at -079. "AdX Auction Logic" (October 20, 2014). Internal Google presentation stating that only AdWords may submit two bids to the AdX auction. ("Only AdWords may submit two bids. All other buyers may only submit one bid per ad request.").

[908] GOOG-NE-13468541 at -541. "Bernanke experiment analysis (THIS IS THE INTERNAL TO GTRADE DOC NOT TO BE SHARED!)" (February 12, 2018). Internal Google document by [redacted], Nirmal Jayaram, [redacted]. ("Analysis shows that on queries won by GDN, GDN second prices itself over [redacted]. If GDN were to only submit one bid, the publishers will only receive [redacted] of their current payout.")

[909] GOOG-DOJ-14952731 at -731. "[Launch 106307] gTrade: Project Bernanke" (September 24, 2013). Internal Google gTrade team launch document of Bernanke. ("With this project, we are doing a little quantitative easing on the AdX, a la Bernanke: GDN will take a *negative* revshare to allow advertisers to win even more AdX auctions. The cost from this negative revshare will be balanced by increasing the revshare on other auctions by lowering GDN's second bid (which is used to second-price GDN sometimes"); See also GOOG-TEX-01266874 at -874. "Bernanke experiment analysis (THIS IS THE INTERNAL TO GTRADE DOC NOT TO BE SHARED!)" (February 12, 2018). Internal gTrade team document on the results of a Bernanke experiment. ("As part of project Bernanke, we reduce the second bid (and in some cases drop the second bid completely) and create a pool of money, which we then reinvest by increasing the first bid on queries in order to win potentially unmatched queries.")

[910] Google's percent revenue is listed as 14% on some documents and 15% on others. See GOOG-NE-13624783 at -786. "gTrade Team Background" (April 21, 2020). Internal gTrade PowerPoint on Bernanke. ("14% margin on each query"); GOOG-DOJ-28385887 at -889. "Beyond Bernanke" (August 17, 2015). Internal gTrade PowerPoint on Bernanke. ("Submit top two CAT2 bids to the AdX auction after deducting GDN buy-side margin of 15%.");

[911] [redacted].

[912] GOOG-DOJ-14952731 at -731. "[Launch 106307] gTrade: Project Bernanke" (September 24, 2013). Internal Google gTrade team launch document of Bernanke. ("With this project, we are doing a little quantitative easing on the AdX, a la Bernanke: GDN will take a *negative* revshare to allow advertisers to win even more AdX auctions.")

[913] GOOG-DOJ-14952731 at -731. "[Launch 106307] gTrade: Project Bernanke" (September 24, 2013). Internal Google gTrade team launch document of Bernanke. ("The cost from this negative revshare will be balanced by increasing the revshare on other auctions by lowering GDN's second bid (which is used to second-price GDN sometimes").

Figure 27

723. It is important to note that Google expected to achieve its own 14% revenue share "in expectation." That means that over some period of time, Google would collect 14%, on average, of advertiser payments. However, since Google was operating this as a statistical procedure, this was not guaranteed, and publishers could end up paying more to Google but without knowledge of that to allow them to consider alternative selling options.

724. In 2015, Google launched Global Bernanke.[915] Global Bernanke operated similarly to the previous iteration of Bernanke, with the added nuance that allowed GDN to charge 14% on average across *all* publishers rather than per publisher.[916]

725. Global Bernanke only increased the risk to publishers as Google averaged its take rate across all publishers and not a given publisher. This meant that some publishers may end up paying more to Google but without knowledge of that. When a company's customer is charged a higher price for a service, the customer must know what is happening for competitive processes to operate. However, Google operated this entire algorithm statistically, which meant that publishers could not transparently identify whether a decline in revenues it received after Google took its payment was due to Google's actions or some other

[914] GOOG-TEX-01266874 at -874. "Bernanke experiment analysis (THIS IS THE INTERNAL TO GTRADE DOC NOT TO BE SHARED!)" (February 12, 2018). Internal gTrade team document on the results of a Bernanke experiment.
[915] Google's First Am. Resps. and Objs. to Plaintiff's Third Set of Interrogs. (May 24, 2024) at 12.
[916] GOOG-DOJ-AT -02471194 at -194. "Global Bernanke" (July 26, 2015). Internal gTrade document on Global Bernanke. ("Global Bernanke is an extension of project Bernanke in which GDN retains a 15% margin on AdX as a whole, while deviating from 15% on individual publishers.").

change in market conditions. Publishers need that knowledge to decide whether alternative options involve a low price to be paid. However, by design and by choice, Google did not make that information available to publishers. Thus, the first step in enabling competitive forces to work was subverted.

726. In the following section, I will provide more details about the evolution and nuances of Bernanke. In so doing, my focus is on the economic consequences of Bernanke, and I do not offer any opinion on whether such conduct was deceptive and may have violated laws other than antitrust laws. The sike focus of my report is on the economic analysis to support consideration of anticompetitive consequences.

727. Prior to the AdX auction, GDN ran an auction called the "CAT2" auction with only GDN advertisers. GDN then submitted the top two bids from that auction to AdX.[917] Bernanke took effect after the GDN CAT2 auction by adjusting the bids submitted to the AdX auction. [redacted]

[917] GOOG-AT-MDL-001412616 at -618. "Project Bernanke and margins story" (Q1 2019). Internal Google PowerPoint on Bernanke. The slide shows "Adwords bid b_1" and "Adwords bid b_2" both being submitted to the CAT2 auction.
[918] GOOG-AT-MDL-001412616 at -621. "Project Bernanke and margins story" (Q1 2019). Internal Google PowerPoint on Bernanke. ("Alpha and beta as two knobs: we win some queries that we wouldn't have won otherwise. Lowering beta: lower pub payout.").

Figure 28

Bernanke Multipliers are applied after the CAT2 internal auction and prior to submission to AdX[919]

728. [redacted][921]

729. Through Bernanke, Google could overcharge advertisers the GDN take rate for low-demand impressions and subsidize the GDN take rate on high-demand impressions that GDN was likely to lose. According to the gTrade team, the subsidization was balanced by the overcharge.[922]

730. For a given publisher, Bernanke could lower bids enough times that there remains a pool of excess funds that are not fully applied to high-demand impressions for that publisher. In this situation, even if Bernanke ensures the 14% take rate is achieved overall, the publisher would not earn their full

[919] GOOG-AT-MDL-001412616 at -621. [redacted].

[920] GOOG-NE-13468541 at -542. "Bernanke experiment analysis (THIS IS THE INTERNAL TO GTRADE DOC NOT TO BE SHARED!)" (February 12, 2018). Internal Google document by [redacted], Nirmal Jayaram, [redacted]. ("It is important to note that in this entire process, we only use information about the GDN bid and the GDN price paid on queries won by GDN. In other words, we do not use any AdX buyer information.").

[921] GOOG-NE-13468541 at -542. "Bernanke experiment analysis (THIS IS THE INTERNAL TO GTRADE DOC NOT TO BE SHARED!)" (February 12, 2018). Internal Google document by [redacted], Nirmal Jayaram, [redacted]. ([redacted]).

[922] GOOG-NE-06839089 at -098, -099. "Project Bernanke: Quantitative Easing on the AdExchange." (October 2013). Internal gTrade PowerPoint on Bernanke.

expected payout. Because of this, the Bernanke model incorporated a safety mechanism to prevent significant loss of yield. However, Bernanke still allows some publishers to receive only [redacted] of their expected payout.[923]

731. Until 2015, Google maintained a pool to achieve an average take rate by publisher. For every impression where Bernanke reduced a publisher's revenue, Google would overpay for another impression.[924] In 2015, Google launched "Global Bernanke," which turned the pool from a per-publisher average take rate to a pool across publishers.[925] The model used publisher-specific factors such as expected conversion rate and potential to win incremental queries in deciding publisher margin and balancing the pool.[926]

732. By 2019, AdX began operating a first price (1P) auction. The move to the 1P auction required a change to Bernanke.[927] The new 1P Bernanke project was called Alchemist.[928] Google's stated goal with the Alchemist project was to keep bidding truthful on the buy-side, where advertisers have no incentive to misreport their value and still bid in the first-price auction.[929] Google described that the Alchemist, or 1P Bernanke optimized for "publisher welfare" despite being a buy-side tool.[930]

733. Google secretly launched Bernanke and all subsequent iterations of the program. Internally, when discussing the development of various GDN communications, Google explicitly made clear that "the first

[923] GOOG-DOJ-AT -02471194 at -194. [redacted]

[924] GOOG-NE-13468541 at -541. "Bernanke experiment analysis (THIS IS THE INTERNAL TO GTRADE DOC NOT TO BE SHARED!)" (February 12, 2018). Internal Google document by [redacted], Nirmal Jayaram, [redacted]. ("As part of project Project Bernanke, we reduce the second bid (and in some cases drop the second bid completely) and create a pool of money, which we then reinvest by increasing the first bid on queries in order to win potentially unmatched queries.")

[925] GOOG-DOJ-15637938 at -938. [redacted].

[926] GOOG-DOJ-15637938 at -938. [redacted].

[927] Google's First Am. Resps. and Objs. to Plaintiff's Third Set of Interrogs. (May 24, 2024) at 12.

[928] GOOG-DOJ-AT -02224828 at -828. "The Alchemist" (March 2019). Internal Google document on the Alchemist's mechanism. ("The Alchemist (AKA First Price Bernanke)").

[929] GOOG-DOJ-AT -02224828 at -828. "The Alchemist" (March 2019). Internal Google document on the Alchemist's mechanism. ("Alchemist is a mechanism that: is truthful: no advertiser has an incentive to misreport her value; is individually rational: no advertiser pays more than its declared value; submits first price bids to publishers (while being truthful from buyer's perspective).").

[930] GOOG-DOJ-AT -02224828 at -828. "The Alchemist" (March 2019). Internal Google document on the Alchemist's mechanism. ("Alchemist is a mechanism that: […] maximizes welfare for its spending: no mechanism can pay the same/lower amount of money to publishers and achieve a higher welfare.").

a) Google implemented Bernanke to override publishers' high floors on AdX

738. As Google described in its Bernanke experiment analysis, [redacted]. The primary reason for the low match rate is the reserve prices set by the publisher, which need to be beat for an ad to win the auction." [935] Google developed Bernanke so that GDN could clear more impressions on AdX; impressions that GDN would otherwise have lost due to high publisher floor prices. Based on a Google email from Eisar Lipkovitz, Vice President of Engineering for Display and Video Ads at Google, Bernanke was designed to allow GDN to "bid higher in order to clear a floor."[936]

739. Additionally, Google discussion on Bernanke state that applying the alpha multiplier to raise the first GDN bid into AdX "helps GDN overcome floors and reserve prices."[937] However, if clearing previously high floors was the only impact of Bernanke, I would expect to see increased transactions in AdX for GDN and little change for other AdX buyers. However, the main impact of the program is that GDN transactions increase while other AdX buyer matches decrease after launch.

740. Bernanke creates three possible auction scenarios that have varying impacts on rival ad-buying tools.

741. In the first possible scenario, when GDN second bids itself, Bernanke kicks in to deflate or drop the second bid, and the GDN advertiser pays the original second price. In this scenario, Bernanke does not affect the non-Google advertiser in this auction. The impression would be won and paid by the Google advertisers with or without Bernanke.

742. Similarly, in the second possible scenario, Bernanke does not impact non-Google advertisers. In this auction scenario, when the publisher's floor price is higher than all submitted bids, Bernanke inflates the GDN bid to be higher than the floor price. Without Bernanke, the non-Google advertiser would not have won the transaction since its bid was lower than the floor. Although Bernanke allows a GDN

[935] GOOG-NE-13468541 at -541. "Bernanke experiment analysis (THIS IS THE INTERNAL TO GTRADE DOC NOT TO BE SHARED!)" (February 12, 2018). Internal Google document by [redacted], Nirmal Jayaram, [redacted].
[936] GOOG-NE-13549438 at -438. "Re: Bid transparency" (February 17, 2017). Internal email thread between [redacted], Nirmal Jayaram, [redacted]. ("It sounds like I don't understand how Bernanke works, I was under the impression we bid higher in order to clear a floor, not go crazy over.").
[937] GOOG-NE-11902954 at -966. "Aligning for a programmatic future" (undated). Internal Google document on programmatic future regrouping product and sales meeting notes. ("First AdX bid is between 1-4x GDN first bid = helps GDN overcome floors and reserve prices, and beat out AdX Buyers.").

However, the publisher would also incur the debt of [redacted],[1038] which it would have to pay back to AdX in another auction. In sum, without the combined effects of DRS v2 and Last Look, the publisher would gain $6 over the long run. However, with the combined effects of the DRS v2 and Last Look, it generates [redacted] in the long run, which constitutes a loss for the publisher.

c) DRS allowed Google to maintain a high overall take rate

811. Google documents show that AdX has charged around 20% take rate on average across open auction transactions (with the exception of brief periods of time when DRS v1 was in place).[1039] Google-produced data also shows that Google has been charging approximately a 20% take rate on open auctions since 2013, as show in Figure 33 below.

[1038] GOOG-NE-13207241 at -245. "AdX Dynamic Revshare v2: Launch Doc" (undated). Interal Google DRS launch document (this document presents precise formulas for these calculations for the debt accounts for DRS v2, but it abstracts away from the 1 cent differential usually paid above the price floor.).

[1039] AdX take rate is 10-20%. *See* RBB Economics, 2020, "Google's ad tech take rates: Analysis of Google auction level data sets" (October 20, 2020). Page 6. Available at: https://www.accc.gov.au/system/files/Google%20-%20Report%20by%20RBB%20Economics%20%2813%20November%202020%29.pdf Internal documentation shows that AdX took [redacted] take rate for Google Ads and third-party buyers in 2016, [redacted] take rate for Google Ads and 20% take rate for third-party buyers in 2017, and [redacted] take rate for Google Ads and [redacted] take rate for third-party ad buyers in 2019. *See* GOOG-NE-05267182 at -187. "Display P&L Update - May" (May 2017). Internal Google presentation showing the take rate in 2016. GOOG-NE-03730572 at -586. "Display RevForce" (June 7, 2018). Internal Google presentation showing the take rate in 2017. GOOG-NE-02643927 at -927. "2019 DVA Waffle: Buyside Fee, Rev Share, Net Rev % & Media Spend" (October 1, 2019). Internal Google presentation slide showing the take rate in 2019.

UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
SHERMAN DIVISION

The State of Texas, et al., Plaintiffs; v. Google LLC, Defendant.	Case No. 4:20-cv-00957 Hon. Sean D. Jordan Special Master: David T. Moran

ERRATA TO JUNE 7, 2024 EXPERT REPORT OF JOSHUA GANS

JULY 24, 2024

I submitted a report in this matter on June 7, 2024. Upon further review of my report, I have identified errata as listed in Appendix A attached hereto. None of these changes affect my opinions in this case.

July 24, 2024

Joshua Gans

APPENDIX A

Reference	Text	Corrected Text
¶ 11	$340 and $890, per hour,	$340 and $890 per hour,
¶ 18(b)	publisher tool products	publisher tool
¶ 21	advertising are relatively	advertising is relatively
¶ 21	Advertisers place value on being able to attract the attention of those consumers who are willing to pay to place their ads in publisher ad space. Thus, the publishers supply ad space that the advertisers demand.	Advertisers place value on being able to attract the attention of those consumers who are likely to purchase their products or services. Thus, the publishers supply ad space that the advertisers demand.
¶ 42	users; the ads	users. The ads
¶¶43,44	ad technology	ad tech
¶ 71	In this report, I will use "advertisers" as a general term for market participants who purchase advertisements.	In this report, I use "advertisers" as a general term for brands, who use buy-side tools to advertise their product and services, and agencies.
¶ 49	e.g. being able to recall login information, shopping carts etc.	(e.g. being able to recall login information, shopping carts etc.)
¶ 52	As explained in Section III	As explained in Section III.B.
¶¶ 74, 232, 285	fulfil[s]	fulfill[s]
¶ 75	a display advert	a display advertisement

Appendix A

¶ 78	I note that Google internally makes a distinction between these main ad types, given their non-substitutability in terms of advertiser campaign goals. In this section, I describe each of the five advertising types.[38]	In this section, I describe each advertising type and I show that Google internally acknowledges their non-substitutability. [Delete fn. 38]
¶ 87	Social media has made is possible for …	Social media has made it possible for …
¶ 91	chance to play."48	chance to play."[48]
¶ 93	Publishers sell their space on websites...	Publishers who sell their space on websites…
¶ 100	an ad tech tool called publisher ad server,	an ad tech tool called a publisher ad server,
¶ 119	Header bidding	Header Bidding
¶ 123	Those four markets are situated in each stage of the "production" chain from advertisers, …	Those four markets are situated in each stage of the "production" chain; from advertisers, …
¶ 132	market. ad tech tools	market. Ad tech tools
¶ 135	geographic driven constraints	geographically driven constraints
¶ 136	sale open web display inventory	sale of open web display inventory
¶¶ 136-137	outstream video inventory	in-stream video inventory
¶ 141	Broadstreet	Broadstreet Ads

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¶ 142	relevant markets across the ad tech stack relatively few	relevant markets across the ad tech stack, relatively few
¶ 163	Even if publishers abandon	Even if some publishers abandon
¶ 192	A relevant market for the transaction of indirect open web display advertising exists if *either* publishers or advertisers lack sufficient substitutes because under either circumstance, such that a monopolist that owns all the ad exchanges could profitably raise prices by a SSNIP.	A relevant market for the transaction of indirect open web display advertising exists if *either* publishers or advertisers lack sufficient substitutes because under either circumstance, a monopolist that owns all the ad exchanges could profitably raise prices by a SSNIP.
¶ 200	they do not allow publishers prefer to solicit bids…	they do not allow publishers to solicit bids…
¶ 205	an Active Aging campaign."200	an Active Aging campaign."[200]
¶ 206	you can charge for you ad inventory."	you can charge for your ad inventory."
¶ 207	publisher with highly	publishers with highly
¶ 211	It also it distinguishes	It also distinguishes
¶ 213	ad exchanges_for	ad exchanges for
¶ 215	ad exchanges' CPMs depends	ad exchanges' CPMs depend
¶ 222	These WGPs often internally determine what advertiser will permitted able to advertise on their properties.	These WGPs often internally determine what advertisers will be permitted to advertise on their properties.

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¶ 226	Connected TV inventory, search inventory.	Connected TV inventory, and search inventory.
¶ 267	the 2014 Google chart.	a 2014 Google chart.
¶ 283	Google defines this as "media buying fragmentation", which leads … Google has a playbook for advertisers to "best leverage Google Ads and DV360 Together"	Google defines this as "media buying fragmentation," which leads … Google has a playbook for advertisers to "best leverage Google Ads and DV360 Together."
¶ 295	Economists use monopoly power would be used to describe market power that is substantial.	Economists use monopoly power to describe market power that is substantial.
¶ 297	An inference of monopoly power also exists when there are -- high market shares and barriers to entry.	An inference of monopoly power also exists when there are high market shares and barriers to entry.
¶ 300	the provider possess in the relevant market.	the provider possesses in the relevant market.
¶ 304	(In the presence of strong network effects, ...	In the presence of strong network effects, ...
¶ 325	market participants and competitors, it is instructive to…	market participants and competitors. It is instructive to…
¶ 343	(ii) this strategy is made more profitable	(ii) made more profitable
¶ 351	calculations. […] internal counsel	calculations. […] [I]nternal counsel

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¶ 354	(Paragraph <345>)	(Paragraph 351)
¶ 363	DFP collects a large volume of user and transaction data giving.	DFP collects a large volume of user and transaction data.
¶¶ 375, 384	open web display advertising .	open web display advertising.
¶ 377	For an individual exchange, indirect network effects emerge when the value buyers is increasing in the number and activity of sellers and vice versa.	For an individual exchange, indirect network effects emerge when the value of access to buyers is increasing the number and activity of sellers and vice versa.
¶ 394	The lower bound on Google Ads' market share in the relevant market the very conservative that:	The lower bound on Google Ads' market share in the relevant market makes the very conservative assumptions that
¶ 394	consistence	consistent
¶ 395	buying tools' share of AdX impression surpass	buying tools' share of AdX impressions surpasses
¶ 399	and that that	and that
¶ 405	through a buying tool; the more information	through a buying tool, the more information
¶ 405	discussed how that it was hard for the model	discussed how it was hard for the model
¶ 405	DBM advertisers with only 15% of whom	DBM advertisers, only 15% of whom
¶¶ 415, 458; fn. 307	AdTech	ad tech

Appendix A

¶ 422	This transformed AdX into a "must-have" exchange.[502] As large volumes of advertiser demand were not available on other exchanges.	This transformed AdX into a "must-have" exchange,[502] as large volumes of advertiser demand were not available on other exchanges.
¶ 430	publisher's	publishers
¶ 439	stated	states
¶ 450	Monetization	monetization
¶ 454	separately	separate
¶ 458	subvert competition between exchanges; competition that	subvert competition between exchanges, competition that
¶ 462	"second price auction.	"second-price auction."
¶¶ 463, 464	reservation price	reserve price
¶ 470	different, the 'size'	different. The 'size'
¶ 473	Suppose that provider	Suppose that a provider
¶ 481	first price auction	first-price auction
¶ 484	majority of impressions	a majority of impressions
¶ 486	this)"	this)."
¶ 501	"This	"[t]his
¶¶ 501, 518	"Pubs	"[p]ubs
¶ 514, 515	Robert Thomason	Robert Thomson
¶ 518	once	one
¶ 525	As evidenced above, publishers…	As evidenced in Figure 19, publishers…
¶¶ 525, 529	second price to first price	second-price to first-price
¶ 543	A 2020 article explains that Google shut down the House tag as a way to prevent publishers from escaping UPR.	A 2020 article explains that Google shut down the House tag as a way to prevent publishers from escaping UPR.[FN]

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		[FN] AdTagMacros. "Google Ad Manager (DFP) System Limits and Line Item Restrictions (Updated 2020)" (February 9, 2020). Accessed on July 19, 2024. https://adtagmacros.com/google-ad-manager-dfp-system-limits-and-line-item-restrictions-updated-2020/ ("Streamlining First Price auction: There was a tweak in line item setup which publisher was doing, The tweak is Setting up House Line items and using AdSense or Adx creative inside or third party Demand Tags as Creative. By doing this Publisher makes Google Adsense or Adx pay more and increase the competition in the first Pricing Model. This is also one of the reasons that Google has removed House line items from Google Dynamic Allocation.").
¶ 547	before its acquisition by Google, represented an improvement	before its acquisition by Google, DA represented an improvement
¶ 582	create the opportunity publishers and exchanges	create the opportunity for publishers and exchanges
¶ 583	[redacted] described these alternatives "I realize I'm kind-of describing what DFP is, but without all the special cases between Google products, e.g. "backfill to Adx" becomes "backfill to whatever", or even something more configurable–let them program it.	[redacted] described these alternatives "I realize I'm kind-of describing what DFP is, but without all the special cases between Google products, e.g. 'backfill to Adx' becomes 'backfill to whatever', or even something more configurable–let them program it.
¶ 599	last look	Last Look
¶ 605	Section VI	Section V.C.
¶ 617	SSP2 cannot server	SSP2 cannot serve
¶ 620	has a positive impact on revenue between 10-25%.	has between a 10-25% positive impact on revenue.
¶ 625	system where exchange compete	system where exchanges compete

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¶ 628	In 2014, Google AdX the ability	In 2014, Google AdX had the ability
¶ 639	knowledge do to.	knowledge to do.
¶ 655	single lie-item	single line-item
¶ 673	citation omitted	…which is important to their business."[FN] [FN] GOOG-DOJ-32022633 at -638.
¶ 674	was, The Washington Post	was The Washington Post
¶ 677	the other three anticompetitive conduct	the other three anticompetitive conducts
¶ 680	Publishers need detailed transaction data in order to understand the auction's operations, including bid amounts and how winning bids are determined, set reserve prices, and to monitor their financial performance across exchanges	Publishers need detailed transaction data in order to understand the auction's operations, including how winning bids are determined, how reserve prices are set, and how best to monitor financial performance across exchanges.
¶ 703	competitive process; a complication	competitive process, a complication
¶ 704	Google's auction In other words, Google	In other words, Google
¶ 708	benefited it multiple markets.	benefited it in multiple markets.
¶ 710	As such, Bernanke distorted matches publishers' impressions and the ads delivered in GDN's favor, reducing the quality of matches	As such, Bernanke distorted matches between publishers' impressions and the ads delivered in GDN's favor, reducing the quality of those matches
¶ 711	even when had the	even when they had the
¶ 716	affecting competition in the exchange market	[*delete clause*]
¶ 721	share .	share.
¶ 726	The sike focus of my report	The sole focus of my report
¶ 773	take-rate	take rate
¶ 776	non-price transparency	price non-transparency
¶ 781	both the customers and sell-side tool providers	both the publishers and the sell-side tool providers
¶ 800	buyer's view"	buyer's view."
¶ 834	opted out:	opted out.

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¶ 838	: "our	: "[O]ur
¶ 838	states, “You	states, “[y]ou
¶ 838	optimization”	optimization.”
¶ 848	adjust AdX rate	adjust the AdX rate
¶ 848	This opportunity cost can harm the publisher financially as DRS adjusted take rate can lower the payout on a per-impression basis.	This opportunity cost can harm the publisher financially as the DRS-adjusted take rate can lower the payout on a per-impression basis.
¶ 851	Google represented that its auction as sealed and second-price.	Google represented that its auction was sealed and second-price.
¶ 865	reduced match quality and, potentially, and made it more difficult	reduced match quality and made it more difficult
¶ 881	impact of Header Bidding.1132	impact of Header Bidding.[1132]
¶ 885; fn. 1138; fn. 1139	Brian O'Kelly	O'Kelley
¶ 885	fees to 8.5%.1138	fees to 8.5%.[1138]
¶ 886	agnosticsm	agnosticism
¶ 889	end user	end users
fn. 2	less of	fewer
fn. 3	Plaintiff States Alaska, Arkansas, Florida, Idaho, Kentucky, Louisiana, Mississippi, Montana, Nevada, North Dakota, Puerto Rico, South Carolina, South Dakota, Texas, and Utah	Plaintiff States Alaska, Arkansas, Florida, Idaho, Louisiana, Mississippi, Montana, Nevada, North Dakota, South Carolina, South Dakota, Texas, and Utah and the Commonwealths of Kentucky and Puerto Rico
fn. 18	In this context, video ads referred to are “outstream” video ads. “Instream” video ads are part of the relevant market.	In this context, video ads referred to are “instream” video ads. “Outstream” video ads are part of the relevant market.
fn. 33	citation omitted	eliminate fn. 33

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fn. 37	GOOG-AT-MDL-001004706 at -713. “Ad Manager Ecosystem 101” (June 2019). Internal Google presentation introducing the ads ecosystem by gTech. (Internal slide distinguishing between inventory types)	GOOG-AT-MDL-001004706 at -713. “Ad Manager Ecosystem 101” (June 2019). Internal Google presentation introducing the ads ecosystem by gTech.(“There are 3 main inventory types: display content […], video content […], in-app […]. 4th main inventory type is search ads […].”).
fn. 49	Aboud video ad formats	About video ad formats
fn. 402	switching cots	switching cost
fn. 402	ti switch from	to switch from
fn. 449	See also See e.g.,	See, e.g.,
fn. 558	Max Louser	Max Loubser
fn. 650	citation omitted	Headerbidding.co. “7 Tips to Optimize Unified Pricing Rules" (January 5, 2024). Accessed on June 1, 2024. https://headerbidding.co/setup-unified-pricing-rules-in-gam/
fn. 651	citation omitted	Headerbidding.co. "What is Unified Pricing in Google Ad Manager" (August 26, 2021). Accessed on June 1, 2024. https://headerbidding.com/programmatic-101/unified-pricing-in-google-ad-manager/
fn. 652	citation omitted	Playwire. "Revolutionizing the Use of Unified Pricing Rules to Maximize Ad Revenue" (Undated). Accessed on June 1, 2024. https://www.playwire.com/blog/revolutionizing-the-use-of-unified-pricing-rules-to-maximize-ad-revenue
fn. 699	of what we thing	of what we think
fn. 809	this wil enable	this will enable
fn. 843	[redacted]	[redacted]

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fn. 852-855	[redacted]	[redacted]
fn. 857	[redacted]	[redacted]
fn. 858	[redacted]	[redacted]
fn. 882	[redacted]	[redacted]
fn. 883	[redacted]	[redacted]
fn. 933	[redacted]	[redacted]
fn. 993	Interal	Internal
fn. 1127	Novermber	November